Nature Magazine

OCTOBER
1959

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NUMBER 8

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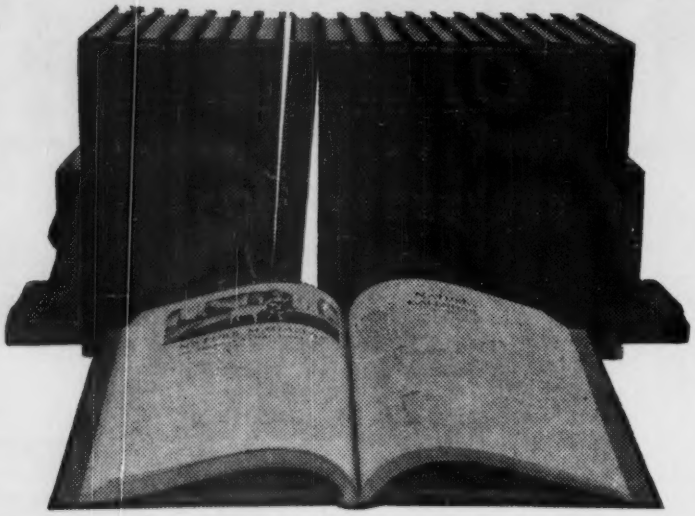

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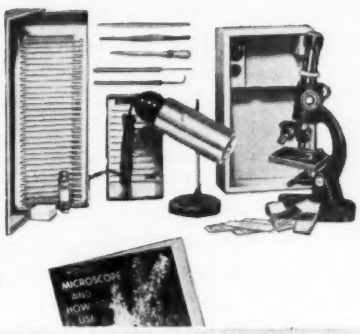

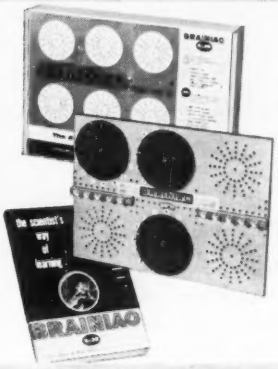

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Nature Magazine

OCTOBER, 1959 VOL. 52 NO. 8

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IN THIS ISSUE

SUBSCRIPTION RATE

NATURE MAGAZINE is published monthly, October to May, inclusive, bimonthly, June to September, inclusive, by the American Nature Association. Second class postage paid at Washington, D.C., and at additional mailing offices. U.S. and Canada one year, $5; foreign, $.50 extra; two years, $9; life, $100.

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Nature Magazine, past and present, is indexed in The Reader's Guide in your public library.

Reviews

They Explored!

By Rhoda Hoff and Helmut de Terra. New York. 1959. Henry Z. Walck, Inc. 120 pages. $3.25.

Here are biographies in brief of six explorers—Alexander von Humboldt, David Livingstone, John Charles Fremont, Sven Anders Hedin, Robert Falcon Scott and Maurice Herzog. The authors have skillfully condensed the story of these adventure-packed lives, drawing, in the process, on the writings of the men themselves.

Hot and Cold

By Irving Adler. New York. 1959. The John Day Company. 128 pages. Illustrated by Peggy Adler. $3.00.

We speak of a hot day or a cold day, but what do we really know about heat and cold? Man has delved deeply into the subjects, creating extremes of hot and cold, putting both to work. In this simply yet authoritatively written book many questions are answered, some of which most of us have never thought to ask.

1001 Questions Answered about Trees

By Rutherford Platt. New York. 1959. Dodd, Mead and Company. 319 pages. Illustrated. $6.00.

This is another book in this series of questions and answers books that provide an interesting approach to such subjects as birds, weather, astronomy, seashore, minerals, the new science, and, now, trees. For the questions and answers the publishers have turned to an eminent writer and lecturer on trees and a plant explorer. His contribution to this series in most successful.

We Come from the Sea

By Hans Hass. New York. 1959. Doubleday and Co. 288 pages. Illustrated. $6.50.

Some eight years ago Hans Hass made cinematic and undersea exploration history with his film and a book with the titles "Under the Red Sea." In this present book he tells the story of a second Red Sea expedition, as well as aqua-lung explorations of the Great Barrier Reef of Australia, and more recent expeditions to the Caribbean and the Galapagos Islands. This is a report of adventure in an area and medium where most of us will never have such experience. Many excellent illustrations—unique illustrations, in fact—supplement the interesting and often exciting text.

Briefly Noted

Otus, The Story of a Screech Owl. By Robert M. McClung. New York. 1959. William Morrow and Co. 48 pages. Illustrated by Lloyd Sandford. $2.50. Story of the life cycle of a screech owl family. Written for the younger reader.

Volcanoes and Glaciers. By Sturges Cary. New York. 1959. Coward-McCann, Inc. 96 pages. Illustrated. $2.50. A "Challenge Book" about Iceland.

Changing the Face of North America. By Patricia Lauber. New York. 1959. Coward-McCann, Inc. 96 pages. Illustrated. $2.50. A "Challenge Book" about the St. Lawrence Seaway.

Island in the Desert. By Charles R. Joy. New York. 1959. Coward-McCann, Inc. 96 pages. Illustrated. $2.50. A "Challenge Book" about the Nile River.

Nature IN PRINT

By HOWARD ZAHNISER

Reflections on Echoes

"MEN HAVE ALWAYS LEARNED from animals, and even in this age of electronics and atomic structure we still have much to learn," comments Donald R. Griffin in a fascinating, recently published book entitled *Echoes of Bats and Men* that discusses the ways in which objects are recognized as present in the dark, in the unseen distance, and in blindness.

The book deals principally with sound and its transmission and reflection, and considers this subject of physics in relation to the way in which living creatures use echoes to sense the presence of objects.

Its applications to the experience of blind people and to the possibilities for helping blind people better to sense their surroundings give the volume a practical and human interest that adds to its informative and interpretive values.

It seems strikingly illustrative of the way in which our lives, our understanding, our appreciations are interrelated with interest in every conceivable aspect of knowledge, including an acquaintance with the creatures of the wild.

The book thus seems significant and interesting in itself and also suggestive of some of our broad concerns for a proper appreciation of Nature, and an attitude toward the use and care of our living resources that recognizes their worth.

Circumstantial interests

Obtained from a rack of recently published paper-bound books on the eve of a quick journey for a weekend on the edge of an Adirondack wilderness, the volume proved to be enjoyable reading before the cabin fireplace on a cloudy, cool morning. A copy of *The New York Times* "picked up" during the all-night automobile drive away from the humidity, heat, and pressures of Washington, D. C., reported the new series in which the book appears as something of current interest and significance. Accordingly it did not take long to see the volume as the subject of this page, the means of justifying at this time of pressures and deadlines another day in the Adirondacks. So it becomes the occasion for this present writing, on this sunny cool hillside, with the prospect of valley and mountains whenever the eyes are lifted from the page.

Written by a professor of zoology at Harvard, this volume on *Echoes of Bats and Men* is one that is part of what its cover describes as "a dramatic new program for the teaching and study of physics." It is the fourth in a new "Science Study Series" of paper-bound volumes "originated recently by distinguished American scientists and educators meeting at the Massachusetts Institute of Technology." *The New York Times* reports that "about fifteen titles a year" are to be issued, and that the series will comprise "more than seventy."

"The Science Study Series," says an introductory note in the book, "offers to students and to the general public the writing of distinguished authors on the most stirring and fundamental topics of physics, from the smallest known particles to the whole universe. . .to provide a survey of physics within the grasp of the young student or layman."

Describing the books as "part of a fresh approach to the teaching and study of physics," this introduction reports that—

"At the Massachusetts Institute of Technology during 1956 a group of physicists, high school teachers, journalists, apparatus designers, film producers, and other specialists organized the Physical Science Study Committee, now operating as part of Educational Services, Incorporated, Watertown, Massachusetts. They pooled their knowledge and experience toward the design and creation of aids to the learning of physics.

"Initially their effort was supported by the National Science Foundation, which has continued to aid the program. The Ford Foundation, the Fund for the Advancement of Education, and the Alfred P. Sloan Foundation have also given support.

"The Committee is creating a textbook, an extensive film series, a laboratory guide, especially designed apparatus, and a teacher's source book."

It is this committee that is cooperating with Doubleday Anchor Books and Wesleyan University in the publication of *Echoes of Bats and Men* and other volumes in this Science Study Series.

Biologist's inquiries

Inclusion of *Echoes of Bats and Men* among the early books in this series is not only evidence of the interrelation of our various departments of knowledge but also the result of the brilliant inquiries of Donald R. Griffin. When he was a senior at Harvard, he took a cage of bats to a physics laboratory that had been set up to detect ultrasonic sounds. There, for the first time, the high-pitched clicks by which bats navigate were heard.

Telling of this event Dr. Griffin says, "By a most fortunate accident I was a student at Harvard, where, in 1938, one of the few physicists then actually studying sounds above the range of human hearing was willing to let my bats register their ultrasonic sounds on his apparatus. This was G. W. Pierce, and a casual visit to his laboratory with a cage full of bats began the line of research that forms the subject of this book."

Appreciating thus the cooperation of physicists, Dr. Griffin also sees now the possibility that biologists may contribute much to the advancement of physics. "I am now beginning to suspect," he says, "that living mechanisms operate in ways that are so intricate and marvelous that if we finally understand them, we will, in the process, have extended the horizons of physics."

An appreciation for fellow contributors to our welfare comes forcefully from a reading of this small volume. It is an appreciation not only of one group of human beings for another, but indeed also a human appreciation of the creatures of other species, other orders, other classes.

From bats Dr. Griffin gained the sure knowledge that sounds sent out by a bat, echoed by an object and heard again by the bat's sensitive ears, enable the bat to fly in the dark and not only avoid collisions with things that "go bump" but also to

catch tiny insects, the myriad of which sustain the bat's life.

Such knowledge has helped men understand that a blind person can similarly avoid collisions because his ears can let him know the reflections from objects of the sounds made by his footsteps.

Other creatures too may thus be of aid to man. Whales and porpoises, for example, may be the sources of suggestions arising from an understanding of their ability to hear sounds underwater.

Close competitors

These marine mammals, Dr. Griffin points out, are not only more closely related to man than are bats but also "have almost as highly developed brains." "Their cerebral hemispheres," he remarks, "rival ours in size and complexity." Whirligig beetles Dr. Griffin also discusses for their ability with specialized antennae to avoid collisions.

Thus Dr. Griffin reports that the "sense organs and brains of men, porpoises, bats, and beetles accomplish extremely difficult feats of detection and discrimination." He points out that "living nervous systems are superior to artificial machines in making a wide variety of fine discriminations." He shows that "there is a true inner satisfaction in discovering new relationships and information to add to our understanding of the world around us."

Dr. Griffin applies the knowledge and understanding so interestingly organized in this volume to the dark difficulties of the blind. He concludes with the hope that "perhaps some reader may have the ideas and the opportunity to make further advances toward a real solution of the blind man's problems of orientation."

Here, in a volume of some 150 pages, obtainable for less than a dollar, are a half-dozen chapters—including one on "Sonar and Radar" and another called "Suppose You Were Blind"—that can give readers a new understanding of the world of sound and sight, of the physical universe and its living creatures, of man and his interrelations with other creatures and his marvelous endowments for learning.

It is fortunate introduction indeed to a Science Study Series, and in itself a treatise on which one can reflect with inspiration and a sense of great possibilities.

Echoes of Bats and Men. By Donald R. Griffin. Anchor Books, Doubleday & Company, Inc. Garden City, N. Y. ($4 in the Science Study Series.) 1959. 156 pp. (4-3/8 by 7-3/8 in.) with back-cover photograph of the author, 15 text figures, list of "Further Reading," and index. 95 cents, $1.10 in Canada. Available to secondary school students and teachers through Wesleyan University Press, Incorporated, Columbus 16, Ohio.

Common Edible Mushrooms

By Clyde M. Christensen. Newton Centre, 59, Massachusetts. 1959. Charles T. Branford Co. 124 pages. Illustrated. $3.50.

Originally published in three editions by the University of Minnesota Press, this handy little volume is a guide to the identification and preparation as food of forty-five varieties of mushrooms.

First Book of Grasses

By Agnes Chase. Washington, D. C. 1959. Smithsonian Institution. 127 pages, with frontispiece in color. $3.00.

Many people are curious about grasses but regard the problem of learning about them as, perhaps, too difficult. They should have recourse to this excellent little book, now available in a third and revised edition. It is an introduction to the grasses, a simple explanation of their structure for beginners. Little or no knowledge of botany is required for its use, and it opens the door to knowledge of the most important of plants—the grasses.

Living Earth

By Peter Farb. New York. 1959. Harper and Brothers. Illustrated with drawings by Louise Katz and photographs by Roman Vishniac. 178 pages. $3.75.

To most people soil is soil, in which grow food plants and flowering plants, grasses, trees and shrubs. Men treat it with fertilizers of myriad variety, douse it with weedicides, fungicides, and insecticides. Most of these people have scant realization of the life within that soil—bacteria, protozoa, insects, earthworms, and small mammals that dwell within it. This little book takes the reader into this realm and describes the complex existence of the creatures of the soil. It should leave one with a vaster respect for the soil and a greater inclination to treat it with understanding.

Reviews

Biographical Memoirs, Volume XXXIII

Published for the National Academy of Sciences by Columbia University Press. New York. 1959. 484 pages. Portraits of biographees. $5.00.

This volume is the latest addition to this fine series of brief biographies of distinguished Americans. This latest volume treats with Albert Francis Blakeslee, Isaiah Bowman, Everette Lee DeGolyer, Leland Ossian Howard, Clark Leonard Hull, Dunham Jackson, Charles Kenneth Leith, Warfield Theobold Longcope, Paul Dyer Merica, Robert Andrews Millikan, Thomas Hunt Morgan, Frederick George Novy, George Washington Pierce, Josiah Royce, Lyndon Frederick Small, Lewis Madison Terman and Horatio C. Wood, Jr. Each biography is supplemented by a bibliography of the principal writings of the subject.

Plant Life

By Lorus J. Milne and Margery Milne. Englewood Cliffs, N. J. 1959. Prentice-Hall, Inc. 283 pages. Illustrated.

This accomplished team of writers on natural history, and members of the faculty of the University of New Hampshire, collaborated on the successful biology textbook entitled *The Biotic World and Man.* From this grew the idea of two volumes that would be entities, yet complementary. Earlier this year, then, *Animal Life* was published, and now comes its companion. Both books have the same goal—"to provide a rounded introduction to living things, particularly as they relate to man and he to them; and to arouse a broad interest in and awareness of progress in the biological sciences." Recognizing botany as an advancing science, the authors have successfully emphasized its dynamic aspects. We have, therefore, a botany textbook that combines readability with a thorough and well-organized treatment of its subject matter. The illustrations are well-chosen and carry on the dramatic impact.

The Orchids

By Carl L. Withner. New York. 1959. The Ronald Press Company. 648 pages, with 158 illustrations. $14.00.

This is a scientific survey of the science of orchidology. Professor Withner, who is Professor of Biology at Brooklyn College and Curator of Orchids at the Brooklyn Botanic Garden, has served as editor and contributor, and has enjoyed the collaboration of fifteen contributing authors. In this volume the stress is placed on the botanical rather than the horticultural approach. It is therefore of outstanding value to the botanist and specialist, and also to the serious orchid fancier. The scope of this large book is international and it will have world-wide appeal and use. It is published as Number 32 in the Chronica Botanica new series of plant science books.

Briefly Noted

Between Earth and Space. By Clyde Orr, Jr. New York. 1959. The Macmillan Co. 253 pages. Illustrated. $4.95. Popular discussion of the atmosphere.

Elementary Astronomy. By Otto Struve, Beverly Lynds and Helen Pillans. New York. 1959. Oxford University Press. 396 pages. Illustrated. $7.00. Astronomy is treated as an integral part of physics—a new approach.

Havasu Canyon. By Joseph Wampler, with chapters by Harold Bryant and Weldon Heald. 2119½ Shattuck Ave., Berkeley, California. 1959. Eric Swenson. 100 pages. Illustrated. $2.00. An illustrated guide and information book to this "gem of the Grand Canyon," the home of the Havasupai Indians.

Man and the Good Earth. By Amabel Williams-Ellis. Illustrated by Robert Eggers. New York. 1959. G. P. Putnam's Sons. 64 pages. $2.00. A Science Explorer book about soil and man's relation to it.

The Autobiography of Charles Darwin. Edited by Francis Darwin. New York. 1959. Dover Publications. 365 pages. Paper-back. $1.65. An abbreviation of the *Life and Letters of Charles Darwin.*

Everyday Meteorology. By A. Austin Miller and M. Parry. New York. 1959. Philosophical Library. 270 pages. Illustrated. $7.50. The science of the weather discussed by two British geographers.

The Birds of Sydney. By K. A. Hindwood and A. R. McGill. Sydney, Australia. 1958. Royal Zoological Society of New South Wales. 128 pages and plates. $4.00. Guide to and list of the birds of the Sydney area.

Ichneumon-Flies of America North of Mexico. By Henry and Marjorie Townes. Washington, D. C. 1959. Smithsonian Institution. 318 pages. $1.25. Listing and data about the Subfamily Metopiinae.

The Unknown Ocean. By Amabel Williams-Ellis. Illustrated by Robert Eggers. New York. 1959. G. P. Putnam's Sons. 72 pages. $2.00. A book on the life of the ocean for the reader aged 8 to 12.

OUR OCTOBER AUTHORS

R. D. Burroughs

Hazel Mohler

During the course of some twenty years the late Edna Peck Atwood, of Avoca, New York, author of a feature article in this issue, was a many-time contributor to Nature Magazine, specializing in stories with an entomological interest. Mrs. Atwood also was a writer of verse and stories for children. . .Hazel Mohler, a teacher of drama and speech at Carmel, California, High School, spends her leisure time exploring the alluring Pacific coast in the vicinity of Carmel-by-the-Sea with her writer-husband, Charles Mohler, and her four-year-old son, Chaco. . .Sara Zimmerman, lifelong resident of Shamokin, Pennsylvania, is a graduate of Columbia University and a former high school teacher. "Having joined the ranks of the writing fraternity," says Miss Zimmerman, "my leading current enthusiasm is research." . . . John and Myra Mehrtens are a husband-and-wife team of writers and photographers who make their home in Dallas, Texas. . .Ivan R. Tomkins, for many years a contributor to the pages of Nature Magazine, is a naturalist of Savannah, Georgia. . .Lyn Harrington, born at Sault Ste. Marie, Ontario, is the distaff side of the well-known and widely-travelled Canadian team of Lyn and Richard Harrington, article and book writers and photographers. . .William D. Barkley, "father" of the famous—if mythical—Dr. Bhugnatz, is an artist-photographer of Baltimore, Maryland. . .R. Darwin Burroughs, native of Iowa, is a graduate of Nebraska Wesleyan and Princeton Universities. After a number of years as assistant and associate professor at several universities, Mr. Burroughs joined the staff of the Game Division of the Michigan Department of Conservation in 1937, and presently is serving in the Department's Education Division in charge of teacher and school education. . .Paul Mason Tilden is assistant editor of Nature Magazine and a resident of Washington, D. C.

Contents Noted BY THE EDITOR

WILLARD GIBBS VAN NAME passed away April 25, 1959, his death receiving far less notice in the conservation field than it was entitled to receive. A distinguished scientist on the staff of the American Museum of Natural History, he will be best known, when a truly objective story of the conservation personalities of the first half of the 20th Century is written, as a valiant crusader. He stood for the maintenance of the national parks for their highest purpose, for the preservation of wilderness before the wilderness concept took form, for the conservation of wild birds and mammals in a period that was largely one of indifference, or wasteful exploitation. Aroused by the natural resource profligacy of the "twenties," he drew upon his modest personal resources to publish pamphlets to sound a much-needed alarm. In 1929, Dr. Van Name's booklet entitled *A Crisis in Conservation* stirred some sincere but rather complacent conservationists, and resulted in the formation, by Mrs. C. N. Edge, of the Emergency Conservation Committee. Through this means his defense of hawks, owls and eagles; his attacks upon the poison campaigns of the then U. S. Bureau of Biological Survey; his crusade to save the sugar pines of California; his fearless fight for natural resource conservation generally, were given wider distribution. His chapter in a biography of American conservationists should be one of the most distinguished.

STANDARD OIL COMPANY OF CALIFORNIA has adopted a conservation program, with emphasis on national parks and enjoyment and protection of wildlife. Among other activities, radio broadcasts to schools, in connection with which manuals are supplied to teachers, are devoted to "Musical Tours of Our National Parks." Short radio messages urge observation and protection of wildlife, bulletin board posters have been supplied to all public and private elementary and secondary schools in the seven western States and Alaska and Hawaii. The entire concept of this program is excellent and constructive—with one exception. We were dismayed to note that Standard of California would display their wildlife appeal design on two hundred poster panel billboards, and that: "Locations have been selected that lead into wildlife areas." Not only are these incongruous and inappropriate, but such locations seem to belie the assertions of the organized outdoor advertising industry that they confine their boards to commercial districts. Conservation of our outdoor resources is not accomplished by plastering the outdoors with billboards.

A SANCTUARY FOR WILDLIFE in the San Jacinto-Santa Rosa Mountains of California is the excellent goal of The Desert Protective Council, Inc., P.O. Box 716, Banning, California, as a means of not only protecting the desert bighorn sheep but associated animal and plant life. The largest herd of the bighorns in California roams this area, patronizing its series of unique water holes. The sanctuary as planned includes considerable acreage now under protection, and the boundaries would exclude areas where deer are abundant—or over-abundant—and must be controlled. Administration would be under the California Department of Natural Resources. The Council will provide further information and would like to receive comments.

BIOLOGICAL APPROACH TO INSECT CONTROL appears to be gaining ground with the U. S. Department of Agriculture, if we may judge from recent releases. Whether this emphasis reflects a reaction to widespread protest against the wholesale use of high-powered and non-selective insecticides or not, it is an encouraging sign. For example, beetles that like to feast on the balsam woolly aphid are being introduced to fir forests. These beetles come from West Germany and are known to entomologists as *Laricobius erichsonnii*. Immigrant beetles are being used in a pilot control test in Maine, and are being established in a colony in North Carolina. The aphid has caused severe losses among firs in Washington and Oregon, as well as the two eastern States. Another example is the use of antibiotics in the fight against the blister rust, which kills millions of white pines annually. The antibiotic called acti-done saved some 300,000 western white pines from certain death in 1958. The treatment, even when by spraying, has no harmful effect on wildlife or fishes, which is certainly in contrast to the other pesticides. It certainly makes sense to enlist Nature's cooperation in control of insect pests and forest diseases instead of upsetting the whole balance of things by using "shot-gun" economic chemicals.

THE ROYAL BANK OF CANADA, in a recent monthly letter to its depositors and other friends, devoted itself entirely to the subject: "Conserving and Using Our Open Spaces." Usually such bank letters discuss subjects of finance or economics, but this letter is concerned with an issue of deep importance, and its recognition as such is a great credit to the bank. Space forbids extensive quotation but the following indicates the fine philosophy of this article: "What humans need for survival in a world containing powerful enemies, physical and mental, cannot be summed up in the food, shelter and clothing formula. They need to be linked together in society and to be able to break apart as individuals. Open spaces provide fresh air and health, but they also provide the restful inspiration that nature gives to most of us. When we are in her domain nature has a way of soothing our fretfulness and easing our worries."

R.W.W.

Great Sand Dunes National Monument, established in 1932, is some 35 miles north and east of Alamosa, Colorado, and contains some of the largest sand dunes in the country.

Of Sand and Avocets

By ROBERT B. McCOY

We were headed for south-central Colorado's great sand dunes one bright morning when we nearly wrecked the car braking to a sharp stop. Just off the road lay a sweetwater pond, and knee deep in the shallow water a flock of American avocets, *Recurvirostra americana*, were busy feeding. While these handsome birds are not exactly rare, they are not common to lower Colorado. They were a rare sight for us, though; we had never seen them in the wild at such close range.

There were fifty-three birds in the flock, all told, for we counted them. Along with the avocets were eight sociable ducks and an uncountable host of nervous sand-

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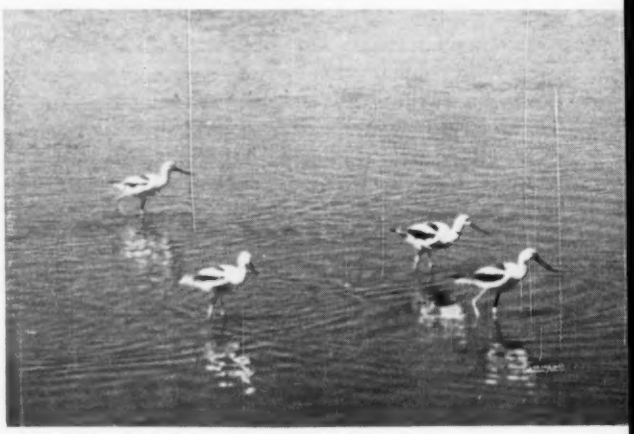
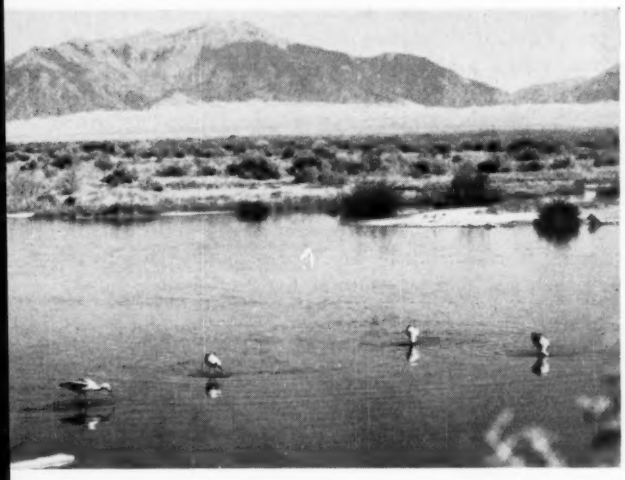


Climbing the dune ridges of this National Monument calls for a certain amount of stamina, as the sand acts much like a thick fluid.

The avocet is a wading bird, and its long thin legs and striking black and white color pattern make identification relatively easy, even from a considerable distance. In the photograph below a group of avocets are probing the silt of a fresh-water pond in quest of crustaceans or other small animal life that forms the birds' diet.



pipers. Not one of the feathered people paid much attention to the stopped auto or the quiet approach of the camera.

Every bird was eating. The avocets, with their characteristic—and slightly ludicrous—side-to-side head-swinging motion, were probing the soft silt and swallowing swiftly. In the deeper water it seemed they would never come up for air. Whatever they were getting must have been delicious, for often their feathers would rise on end in gustatory ecstasy. All birds can *taste*, oddly enough, and most show appreciation for a "goody" by loosening and lifting the shoulder feathers.

The avocets are beautiful birds, supremely unconscious of their own grace and charm. They are fifteen to twenty inches in length, to some extent resembling a small stork or crane. They are black and white, a little like the magpie, and offer dazzling color contrast. (How birds with snow-white feathers can keep them snow-white, especially in mud-holes, is always a matter for speculation!)

These handsome birds have an odd beak; narrow, flat, long and turned up at the end like a pair of cuticle scissors. Both mandibles are fixed, and the whole thing looks perilously fragile. Of course it really is not; as a matter of fact, it is quite a handy weapon when the bird is cornered. We had an idle thought, though, as the busy heads swung rapidly from side to side, beak sliding swiftly through the mud—what happens if it hits a rock? Does the shock run, Disney-like, from head to tail?

The bird is a wader, so it has long legs for the purpose. Being semi-aquatic, it also has webbed toes to the front—three of them. The avocet can swim as well as wade.

Once the avocet was plentiful, ranging over the entire country west of the Mississippi. Unfortunately, its flesh is good to eat. In the way white men seem to have of destroying their natural heritage as fast as they can, the avocets were hunted nearly to extinction. Protected now by the Federal migratory bird law, they have a fair chance to survive so long as there are shallow ponds in which to wade and eat.

The avocet nests in the marshland, and "home" is a grass-lined depression hidden as well as possible by

From a distance, the dunes of Great Sand Dunes National Monument make a white band that reaches nearly ten miles along the base of the Sangre de Cristo Range in south-central Colorado. The dunes owe their existence to the prevailing southwesterly wind that sweeps across the San Luis Valley, carrying sand particles that are dropped as wind velocity is checked by the mountain barrier.

weeds and marsh plants. The hen lays three or four eggs, and sometimes a chummy neighbor hen will drop in and lay another. The eggs are buff-olive, spotted thickly and uniformly with large brown freckles, and they hatch in about fifteen days in the order in which they are laid. The young are like chickens and ducks—they can forage as soon as they are dry.

Because the sexes look alike, no one but the avocets knows whether they are monogamous or bigamous by nature. Both parents take turns incubating the eggs, and both show concern for the young until the babies can shift for themselves. This is in five or six weeks, as a rule.

The avocet, despite its beauty, has a raucous cry. When one starts all the others nearby join in the din—they seem to like it. The birds are excellent flyers, and often use their wings to help run in the water after fast-moving marine tidbits.

We watched the flock until some bird-communication set it noisily a-wing off toward the dunes. Then we surveyed the world about us, and found it good. The dunes lay some ten miles to the northeast, making what appeared at that distance an insignificant white band at the base of the Sangre de Cristo Mountains. Before we got there, though, a terrific rainstorm bore down upon us—we had time to take two pictures before the downpour arrived.

In the manner of Colorado storms, it was upon us and gone, and by the time we reached the dunes, the road was nearly dry again. We saw considerable wildlife among the sagebrush—antelope, coyote, jackrabbit; overhead, a flock of vultures hung motionless in the

On its way toward the photographer is one of the fast-moving downpours typical of the semi-arid Southwest. Within a few minutes after its passage, the road was nearly dry again.

again-dazzling sky. Once more the air was like dry wine.

The great sand dunes, preserved in a national monument, lie thirty-five miles or so north and east of Alamosa. More than 35,500 acres are covered with a marvelously clean and fine-grained sand. This great accumulation of many thousands of years moves constantly in ever-changing ripples, crests and ridges, some of which pile up 600 feet or more.

It is fun to take off the shoes and try to climb the high ridges, but exceedingly hard to do so. The sand is powder-dry, and it moves like a thick and viscous fluid. The walker sinks to his knees at every step.

Some of the lower ridges can be climbed, if you have persistence and stamina—and there is some reason for doing so. The fun then lies in running down the soft slopes with magnificent giant-strides! This is one national monument you can not leave without taking some of it with you—there is sand in your clothing, your ears, your eyes, your fingernails. . .sand everywhere. The Park Service is not much worried about this miniscule loss, though. That sand pile will be there a long time!

If you should ever go there—and you *should* (there are campsites and picnic grounds and accommodating park rangers)—look for the avocets as you go in and out. While you are there, make an effort to stay all night.

The crystalline air of Colorado makes sunset at the dunes a sight of glory. The sky becomes a backdrop of living fire, and purple shadows race toward you from the western horizon. Turn then to the east and watch the towering mountains change before your eyes from majestic peaks to misty shadows. Listen to the wildlife chorus open its nightly concert; for this is a symphony conceived and composed in heaven.

If your timing is right and you are there on a night when the moon is full or bright, walk out in the darkening dunes and see how such a simple thing as light changes the world. How can words describe this sand fantasy? How can words tell of the stillness that the sounds of nightlife only emphasize? How can stars be so brilliant, and the sky so like velvet? How did mere man ever get into this picture of infinite Nature, anyway?

If you were there at sunset, and you walked in the dunes at night, the spectacle remaining is the sun coming up behind the silhouetted Sangre de Cristo Mountains. Here the night is slowly vanquished by an enlarging, spreading radiance; the sky to the east becomes ever more flushed with all the exquisite pastel hues of the spectrum—and then suddenly there is the sun itself. There are no words for this, for it is too beautiful to describe. This is a sight one must *feel* for one's self, as well as see!

CRICKETS AND STONES

The village keeps this broken wall
To hold the township line in place:
Each council lets the boulders sprawl
Beneath low vines spread into lace.

The children wrestle in the sun,
Then lie like stones, without a care.
They listen at the end of fun
To crickets' songs where rocks are bare.

They giggle at the village fool
Who watches crickets all day long,
As if the insects were his school
And teaching with their tiny song.

The fathers of the township talk
Of building schools instead of walls,
Of railings where the neighbors walk
Beside a creek too slow for falls.

The village slumbers into fall;
It turns the year toward gold this way.
The leaves that tumble on the wall
Will not erode the stones away.

The only sounds that linger long
Are those that came before the town,
The only voice the after-song
Of crickets where the wall is brown.

Millard C. Davis

In the course of arranging a bouquet of anemones, the author discovered a light-and-dark-green caterpillar feeding on one of the leaves. "The Green Gourmet," as the caterpillar was nicknamed, was taken into custody, and after passing through its pupal stage emerged as the rather rare moth *Polia adjuncta*, the "Hitched Mamestra."

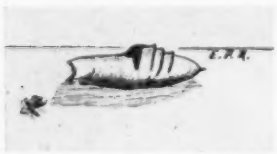
Bringing Up "The Green Gourmet"

By EDNA PECK ATWOOD

Illustrations by the Author

MY FAVORITE old Roman, Marcus Aurelius, asked: "Dost thou not see the little plants, the little birds, the ants, the spiders, the bees working together to put in order their several parts of the universe?"

Well, I confess I never would have seen the equally humble subject of this article if a first-of-October frost had not been sneaking up out of a clear dusk to threaten my flowers. I cut off the Philippinense lilies and the anemones to protect them in the house. While arranging a bouquet of the anemones I discovered an unusual caterpillar occupying the center of a leaf. I had always loved anemones, but here was a fellow with a truly consuming love. He had been eating them! He was one and three-eighths inches of striking color harmony, largely light green trimmed with very dark green. He was truly handsome and quite angular as, contracted, he rested on his host plant. During my life I had seen his kind only twice before. He was not pictured—at least in larval form—in any of my insect manuals. Not knowing his name, I called him "The Green Gourmet."



The pupal case of *Polia adjuncta* was eleven-sixteenths of an inch long, and was dark brown in color.

He rated a life history in an insect "Who's Who." He was no longer a mere caterpillar; he was a project. Wider recognition seemed long overdue.

He must neither drown nor escape. To protect him on both counts, I used cardboard for a barrier between him and the water, punching holes in it for the anemone stems to pass through, and then setting the bouquet into a deep, steep-sided pan or prison compound.

In the morning he was in the bottom of the pan, but still in custody. I maneuvered him back on an anemone leaf and during the day drew sketches of him. He made this difficult by his almost-continuous traveling. He could extend himself prodigiously. If people could stretch themselves accordingly, step-stool manufacturing would cease!

Newly hatched, the Hitched Mamestra was purplish-black, but after a few hours it turned dark gray. It was slender and rather small, measuring seven-eighths of an inch long.

Once, in his wanderings, he made it to the table, and once to the floor. I became certain that he wanted to pupate in soil—he must be a moth larva that would burrow into earth to hibernate until spring in pupa form. He required soil that would not crumble in as he buried himself, soil that could be packed away from him to form a cell when he reached the desired depth. What to do?

There came to memory a plant crock, buried since the previous year out by the line fence. It had had magnolia seeds planted in it. One plant had prospered, and I had protected it through the winter, only to have a late frost that killed the first leaves. It was left for dead and not reexamined. Here was a solution made to order. This soil should be firm, yet moist. So I dug up the

crock, cleaned off the outside, and pulled the weeds and grass out of it, realizing too late that one supposed weed was the little magnolia that had sent out new leaves. Dismay helped nothing. The caterpillar would have to furnish the consolation. Eventually, he did.

A large, wide-mouthed jar soon confined the caterpillar on the crock dirt. His wanderlust continued until late afternoon, and then he began to bury himself. In an hour and a half he was entirely out of sight. Fasting and exercise had shrunken him greatly. Now the crock was consigned to a cold place to await spring; and when it looked too dry, I would set it in a basin of water just long enough for moisture to show on the surface.

When spring came, a vigil had to be kept. The sleeper came fourth in the latter part of May. Lilacs brought into the house furnished the small insect with food. His tongue greedily explored them for nectar.

"I maneuvered him back on an anemone leaf and during the day drew sketches of him."

I dug carefully into the soil of the crock and found his cell, his caterpillar cave, where his broken pupa case still lay. Including the sharp tip, it measured eleven-sixteenths of an inch long, and was dark red-brown.

The newly hatched moth was purplish-black, but in a few hours he turned dark gray. He was beautiful although small, some seven-eighths of an inch long. With wings slightly overlapping down his back in characteristic moth fashion, the wing-tips were nine-sixteenths of an inch apart, while the antennae were seven-sixteenths of an inch long and extremely slender. I had never seen a moth like this before. He was uncommon. I drew his picture. He was so still among his lilacs that I felt he would not fly until dusk. Too trustful, I left him unconfined. When I looked for him later, he was gone. Searching was in vain. Twenty-four hours passed. The moth suddenly appeared, fluttering against a window curtain. Again I offered lilacs, and again he ate with zest.

The next morning, I drew another picture of him. Much of the time the moth sat on my left hand while I drew with my right. He drank thirstily from a drop of water offered on my hand. I discovered that the entire underside of his wings was plain gray.

Through the kindness of a State University entomologist, I learned that this moth's scientific name was *Polia adjuncta*, and that it had the common name, bestowed by Dr. W. J. Holland, of the "Hitched Mamestra." Dr. Holland pictures the moth in his moth book, but not its larva. The accompanying pictures of my "Green Gourmet" will remedy that slight. Long ago I saw one of the same species feeding on a stalk of gladiolus. I am told that the insect prefers goldenrod, aster and related plants, but that it has a wide range of host plants. *Polia adjuncta* is closely related to the Eurasian *P. persicariae*, which English entomologists call "The Dot."

Thus it was that my project of insect indentification, initiated when "The Green Gourmet" first came into the house by way of a bouquet of anemones, came to a happy conclusion—both for the insect and for me!

HARD FROST

The autumn burns, tongued by flames of gold
along the smoking valley; the sky fills
with ash-gray hazes like shrouds on the curled cold
cinders of the hills.
Now winter spills
white-fanged frost on the pools and the rank mould
of the marsh leaves. And the year grows horny and old.

Color drains from the clouds and the cloaked vandal
of storm hulks in the west, and the coiled knout
of a north wind falls. Like Time on an old scandal
snowdrops clout
the fire out.
In bush and grass and tree, summer's ruddy candle
has run out like a thief on a soft sandal.

Helen Harrington

Fascinating to adults and children alike are the long strands of kelp washed ashore on the Pacific Coast after a storm. The "seaweed" known as kelp belongs, as do the other seaweeds, to the plant group Algae.

Kelp, Giant Among the Algae

ALONG the stretches of surf-swept beach on our Pacific Coast, the waves wash up a brown seaweed that collects in great piles after a storm, the dark tones of the seaweed in sharp contrast to the whiteness of the sand.

"That's kelp," a native of the area may remark to an inquiring visitor who is working to untangle the tough ropes of the weed in the pile. Kelp is a form of algae, although most of us think of algae as much more minute in growth. A single piece of kelp washed up on the beach may measure several hundred feet in length, especially if it happens to be of the genus *Macrocystis*, the longest of all known plants.

Kelp is a brown algae that grows in the shallower portions of the oceans. It can be identified from shore by the shiny brown fronds gracefully moving back and forth with the swell of the ocean waves, and by the brown air vessels that float on the surface of the water. A tough "holdfast" anchors the kelp to the rocky bottom of the ocean floor.

In places along the Pacific Coast kelp beds form dense submarine forests as much as four miles long and sometimes more than five hundred feet in width. Occasionally such kelp beds are hazardous to navigators, but more often they act as natural buoys to warn against shallow waters and rocks. Thick kelp beds give a semi-shelter to the inner coast, so that smaller coasting vessels can find smoother waters inside them.

One of the varieties of kelp, scientifically known as *Nereocystis lütkeana*, posesses air vessels that, bobbing in the waves, are often mistaken for the heads of seals. And since the heads of the kelp are about the same in color, as well as size, as seals' heads, it is difficult for even an expert to distinguish one from the other in the kelp beds. The sea otter often takes its rest on the huge fronds of the kelp beds. As a matter of fact, the plant was called "sea otter cabbage" by the Russians who first described this particular variety of kelp in 1840. The commander of the Russian expedition to the Pacific was named Lütke; hence the specific name *lütkeana* was given this member of the genus.

The stalk of *Nereocystis* is sometimes three hundred feet long, and makes an excellent jump-rope for young

The stem, fronds and air vessels of the kelp *Macrocystis*—which constitutes the major kelp beds of the Pacific Coast—strongly resembles a line with dozens of brown fish hanging from it.

Strands of laminae flowing from the bulbous head of *Nereocystis* look like the hair of a sea-nymph.

By HAZEL MOHLER

beachcombers. Some of the shorter stalks make fine whips for children to twirl or throw out to sea. The dried kelp heads pop under foot with a loud noise, and sound like firecrackers when thrown on a bonfire. A dried stem of kelp, when thrown on a fire, will often writhe, resembling a snake as it raises its head from the flames. Horns of many tones can be made from the dried stems and heads of this sea plant, but the Indians around Puget Sound, on the coast of Washington State, used it to greater advantage when they dried the stems for fishing poles.

Pickles may be made from the larger stems, tasting, when properly made, not unlike watermelon pickles. After cutting the rind of the stalk into desired sizes, it is necessary to soak out the salt before pickling. This requires changing the fresh water on the rind for four or five days, or until the rind no longer tastes of salt, before proceeding with the vinegar treatment.

Nereocystis lütkeana is not, however, the most important kind of kelp on the Pacific Coast. The major beds are composed of *Macrocystis pyrifera*, a kelp that grows from San Diego to British Columbia. It has been reported that stems of this alga have been found to exceed a thousand feet in length; and yet the thin, naked stem seldom exceeds a quarter of an inch in diameter. The air vessels floating on the surface are as large as small eggs, and sustain the great fronds that float on the surface. A long stem of *Macrocystis* somewhat resembles a line with dozens of fish dangling from it, because the fronds are shaped somewhat like "whopper" fish.

In addition to these two types of kelp, there is the sea palm, found in tropical waters; as its name indicates, it looks something like a palm tree. East Coast kelps include *Alaria*, *Laminaria*, and *Agarum*, none of which are as large as the West Coast kelps. In Asia, the plant is gathered for food, but in the United States we gather it mostly for other purposes.

Kelp was at one time harvested for its iodine content, but this activity has almost ceased since the first World War. An industry that has flourished on the Pacific Coast since about 1945 makes use of kelp in the production of the chemical sodium alginate, which is extracted from the plant by a boiling process. Sodium alginate is widely used as a gelatinous binder, and an emulsifying agent in the manufacture of candy, ice cream, puddings, cloth sizing, dye, inks, paints, and medicines. One of its particular merits lies in the fact that nobody seems to be allergic to it. If a piece of kelp is picked from the beach and placed in fresh water, it immediately becomes slimy with this gelatinous substance. There are now two companies operating on the West Coast to produce alginates—one at Santa Barbara and the other at San Diego, California.

Kelp has long been used as an agricultural fertilizer because of its high potash content. It is sold commercially for the purpose, but people who live along the seacoast often bury kelp in their yard to build up a pile of humus for the benefit of their gardens.

Like algae, kelp plays an important part in the economy of Nature. The algae convert the so-called impurities in the water into materials essential to animal life. They take in the carbonic acid gas that animals breathe out, and exhale oxygen that animals breathe in. They help furnish the mineral and vegetable food necessary to animal life.

On land, if a forest is destroyed, we know that many animals perish from lack of the food usually provided by forest plant life. In the ocean, if an aquatic forest of kelp is destroyed, many species of animals also perish, because they depend upon this forest for their food.

A great variety of fishes and other sea animals are to be found in kelp beds. One such animal frequently encountered in the kelp beds near Pacific Coast shores is the kelp crab. At low tide it is usually found a few

In the photograph below the stalk of *Nereocystis* has been sliced through to show the thickness of the rind near the "head" of the plant. Pickles are sometimes made from this alga after proper treatment of the larger stems.

inches below the surface of the water, often on a piece of kelp. This crab is dark olive-green in color, and shaped like a shield. The spines on its legs are sharp, enabling it to hold to the kelp in spite of wave-shocks. Kelp crabs are edible, but people who hunt them are careful in handling the animals, because even a small crab will cling to one's finger strongly enough to puncture the skin. A kelp crab large enough to wrap itself around an arm had better be left alone by all but the experienced crab hunter.

In Lower California the southern kelp crab abounds, rounder and more purple in color than its relative along the Pacific Coast of the United States. In addition to kelp crabs, one may find red and pink abalones in the kelp beds, as well as sea fans, sea urchins, sea stars, and acorn barnacles. Of course, these are only a few of the sea animals to be found in the kelp environment. Where kelp grows on rocks or boulders, it meets with competition from tiny sea urchins, which can clear whole areas of the plant by usurping favorable growing locations. The survival of the kelp depends largely on its enormous production of juvenile plants, which grow on a variety of hosts that include other algae and sea grasses.

There is a common belief that chewing dried kelp is an aid to health, and, while this practice may not in itself provide the chewers with anything but a certain amount of roughage, it is a fact that the addition of kelp meal to the diets of some other-than-human animals has produced remarkable results in the growth and well-being of the subjects. It is a known fact that kelp—and seaweeds in general—are rich in minerals and vitamins; but some investigators are convinced that there is an unknown growth factor to be found in the kelps that is well worth an intensive study, and may hold a secret of benefit to man.

For the most part, however, the man on the street, and his children, will still find this remarkable algae, kelp, something to be examined and played with on the beach.

The Spicy Sassafras

By C. C. REED

Photograph by courtesy of
Conservation Commission of West Virginia

Mr. C. C. Reed and his grandson, Karl Thompson, place the measuring tape against a sassafras tree, near Allen Junction, West Virginia, which the Conservation Commission of West Virginia says is the largest reported in that State.

From Maine and New Hampshire to central Florida and west into the plains States, the sassafras tree, invader of abandoned fields, dangles its smooth, shining, simple leaves of varied form. Always a tree of moderate growth, the sassafras attains its greatest size in the mountains of West Virginia, North Carolina and Tennessee.

As a rule, this tree of the aromatic leaves is content, in maturity, with a height of perhaps forty feet and a diameter of a foot or so; but there are exceptions to the rule. Near Allen Junction, West Virginia, there is a sassafras that is not forty feet high, but forty feet to its first limbs! With a diameter of more than three feet near the ground, the deeply furrowed, dark-brown bark is two and a half to three inches thick, and according to the Conservation Commission of West Virginia it is the largest tree of its kind to be reported in the State.

Every farm lad throughout the range of the tree is familiar with the tang of sassafras bark and root, whose essential oil is still used to some extent for flavoring candy and soft drinks; and grandmothers remember the time when sassafras tea was a standard spring tonic to condition the blood for the warm days of summer. The wood of the sassafras is not particularly strong, but its durability in contact with the earth recommends it for use as fence posts and pasture rails. The small blue fruits of the sassafras ripen in September or October, born of greenish-yellow flowers that appear with the leaves in the spring.

To Know the Name of a Plant

By R. D. BURROUGHS

PHOTOGRAPH BY DEVEREUX BUTCHER

The whorled pogonia above is a member of the orchid family, named for Orchis of Greek mythology, child of a nymph and a satyr.

M. R. CLARE

The American Indians of the Northwest used the leaves of the plant known as bear-grass, or squaw-grass, in weaving baskets and hats.

"To know the name of a plant is to have a key to its literature," said Dr. Joseph T. Rothrock, in one of his lectures on wildflowers many years ago.

That plants have a literature aside from technical accounts of their structure and taxonomy still is, I think, a new idea to a great many people. I will never forget the day on which I first heard the story of the naming of *Achillea millefolium*. The occasion was a botany field trip. Our professor paused, and reached for a weed that I knew only by its common name of "yarrow." He told us the story of Achilles, and how he used this herb in treating the wounds of Telephus. Theophrastus, pupil of Aristotle, and the greatest of the ancient Greek botanists, called the plant *Achillea* in memory of Achilles. It was only a weed of questionable beauty and an acrid odor, but it was dignified by Greek tradition and bore the name of a hero-god.

Many other plants named by the ancient botanists bear names suggested by Greek mythology. The orchid of your lady's corsage was named for Orchis, who was born to a nymph and a satyr, and who was reputed to be an individual of uncontrolled passion. According to the legend he became intoxicated at one of Bacchus' festivals, and attacked a priestess. Being apprehended in this act, he was set upon by the company and destroyed. Orchis' father beseeched the gods to restore him to life and health; but, instead, they reassembled him in the form of an exquisite flower whose beauty might serve to appease the gods and delight the earthlings.

Much of the literature relating to plant names is widely scattered, but some of it has been made available to us in the delightful books of Charles Francis Saunders, and other literary naturalists. I also can recommend the source books of plant literature; the writings of Aristotle, Theophrastus, Homer, and Pliny; the "herbals" of the Renaissance botanists; and, for stories of many of the native American plants, the journals of our pioneer naturalists and explorers.

A knowledge of the history and tradition of a plant adds much to one's pleasure upon encountering it. For

The name of Dr. John Torrey, who identified many of the plants collected by John C. Fremont during his western expeditions, is perpetuated in the Torrey pine, a species naturally confined to one small area on the Pacific Coast near San Diego, California.

The common bearberry of our northern forests was referred to in the Lewis and Clark journals as "sacacommis," a corruption of the French words meaning "a clerk's pouch," from the fact that clerks at western French trading posts carried the dried leaves in small buckskin pouches for smoking.

example, in the summer of 1933, in the woods about Deer Lake in northern Minnesota, I found my first specimens of a beautiful little creeping plant called the twinflower. The name is fitting because the pink, bell-shaped flowers always are borne in pairs on long, slender flower stalks. The scientific name of the plant is *Linnaea borealis*, and thereupon hangs another story. The plant was discovered first in Lapland, in 1735, by the great Swedish scholar and botanist Carolus Linnaeus. He was so delighted with this beautiful little boreal plant that he wanted it to bear his name; but modesty forbade him naming a plant after himself, so he turned it over to one of his pupils with the suggestion that it might make a fitting memorial to some great botanist. Whereupon the young man arose to the occasion and named the plant *Linnaea borealis*!

But not all plant names suggest amusing incidents of this kind. Many of them are truly fitting memorials to men who have lived life to its fullest. Not all of them were botanists by profession; there were doctors, ministers, tradesmen, soldiers, and explorers who loved plants, and God's outdoors.

One of these was John C. Fremont. Most of us think of Fremont as a military leader and explorer, but there was another side to his nature. Fremont loved plants, and on his five expeditions to the West, he never failed to return with bundles of pressed specimens many of which were new to science. Most of these collections were turned over to Dr. John Torrey for identification. One bundle contained a flowering shrub of extraordinary beauty and botanic interest, because it proved to be an entirely new genus. Dr. Torrey named it *Fremontia californica*, in honor of the great pathfinder.

Dr. Torrey himself was a stay-at-home. He had a job teaching chemistry in the New York Medical College, and later he was connected with a branch of the United States Assay Office. During his spare time, he did the great work in botany for which he is now famous. It was late in his life before he had an opportunity to see alive many of the plants that he had classified in New York City forty years before. His name is perpetuated in a number of western plants, chief of which is the Torrey pine, a species situated in a small grove near San Diego, California, and found nowhere else in the world as a natural growth.

Many plants that grow in the northwestern States bring to mind the names of Lewis and Clark. While making their historic journey across the continent in 1804-1806, by way of the Missouri and Columbia rivers, they collected and described many plants; but only one hundred and fifty specimens, all collected west of the Rocky Mountains, were brought back safely. Those collected east of the Rockies on the outward journey were lost in transit. In 1814, the collection was turned over to Fredrick Pursh, who examined the plants and named the new species. Among them was a strange plant whose roots seemed to show signs of life, although it had been collected and pressed by Lewis six years earlier. Pursh planted the roots, and much to his amazement they revived and grew. To honor Captain Lewis he named the plant *Lewisia rediviva*, meaning "Lewis' plant that

The twinflower, at the left below, is botanically *Linnaea borealis*, after the scholar and botanist Carolus Linnaeus, while the common white yarrow at the right, *Achillea millefolium*, is said to have been named by the Greek botanist Theophrastus in memory of the hero Achilles, who used the plant as an herb in treating the wounds of Telephus.

PHOTOGRAPH BY VIRGINIA EIFERT

PHOTOGRAPH BY P. M. TILDEN

lives again." The meaning of Latin names is fascinating

The plant is commonly known today as "bitterroot," for which the Bitterroot Mountains and Valley of Montana are named. It has also the honor of being dedicated the State flower of Montana. I like to think of it, however, as the plant that Lewis and Clark discovered on the far western plains; the plant that sustained them when they were hungry, and delighted them when it was in flower.

Nor did Pursh neglect to grant his honors equitably; for, among the plants collected while the explorers were encamped on the Kooskooskie River in Idaho, was one of singular structure and beauty that he named *Clarkia pulchella*, meaning, "Clark's plant, the beautiful."

On June 1, 1806, Lewis wrote concerning *C. pulchella* in his diary: "I met with a singular plant today in blume of which I preserved a specimene; it grows on the steep sides of the fertile hills near this place. . ." Then, after writing a long, careful description of the plant, replete with technical details concerning its structure, he concluded with the statement: "I regret very much that the seed of this plant are not yet ripe and it is probable will not be so during my residence in this neighborhood."

And so this beautiful pink flower, with its four three-lobed petals, remained unknown, except for the pressed specimen in the Lewis and Clark collection, until 1830. Then David Douglas rediscovered it in Oregon and sent the seeds home to England, where it soon became a favorite among English gardeners.

In reading the Lewis and Clark journals, I was puzzled somewhat by their frequent reference to a plant called "sacacommis," until I discovered that they were using this name to designate the common "bearberry" of our northern forests. In explanation, it is said that the clerks in the French trading posts were fond of smoking its dried leaves, which they carried in a small buckskin pouch; hence the name "sac a commis," meaning "a clerk's pouch."

Have you ever seen the bear-grass growing in the mountain meadows, or gazed across the valleys of Multnomah's kingdom, blue with camas? If you thrill to alpine scenes and love the quiet solitude of mountain meadows, you will have a goal; you will not rest until you tread Elysian fields all creamy-white with bear-grass plumes, or blue as sky with hyacinths. And, as you look, you may recall the place these plants have held in history.

Bear-grass, or "squaw-grass" as it is sometimes called, reminds us that Indians used its leaves in weaving baskets, hats, and even cooking vessels. Captain Lewis wrote that "they (the Clatsops) wear a hat of a conic figure without a brim confined on the head by means of a string which passes under the chin and is attached to the two opposite sides of a secondary rim within the hat," and that "these hats are made of the bark of cedar and bear-grass wrought with the fingers so closely that it casts the rain most effectively. . ." He also mentioned that both hats and baskets were used for carrying water, and for cooking vegetables. I thought the latter use improbable, until I learned that they accomplished it by dropping heated stones into the water, bringing it to the boiling point. David Douglas, writing twenty years afterwards, says, of hats and baskets that they "were formed of cedar bark and bear-grass so closely woven with the fingers that they are water-tight without the use of gum or roson. . ."

The camas, or camassia, which the Indians called "quamash," has helped to shape the history of the West. It was perhaps more widely used for human food than any other western plant. Explorers, trappers, pioneers, and all the western Indian tribes depended on it for subsistence when game and fish were scarce, or planted crops had failed.

U. S. FOREST SERVICE

The Douglas fir of the Pacific Northwest honors David Douglas, Scotch gardner who was sent to America to collect plants and seeds for English gardens.

Before the white man claimed the West with ax and plow, the camas fields were tribal property. Boundaries were disputed and wars were waged by rival tribes. Chief Joseph of the Nez Perce led his braves in final desperate combat to save his camas lands from white men moving in to settle Oregon.

The old South also is rich in plant tradition. Most of these stories take us back to the eighteenth century, when the wilderness started at the eastern slopes of the Appalachians; when American and European plantsmen were collecting strange genera and species in the foothills of the Blue Ridge, and in the swamps and pinelands of the Carolinas and Georgia. Per Kalm, the Finnish botanist, spent three years in this area. One of his notable discoveries was the mountain laurel, which he sent to Linnaeus. The great botanist named it *Kalmia latifolia*, in honor of his friend.

The flora of the eastern seaboard also might bring to mind John Bartram, Andre Michaux, Adam Kuhn, and other colonial botanists who were contemporaries of Linnaeus in the time of Britain's George III. John Bartram was among the earliest of the American botanists to gain renown in Europe. It is said that he was an uneducated Quaker farmer at the age of thirty, or perhaps thirty-five, with no technical knowledge of plants. But he had great love for them, as well as the courage to buy a text book of botany written in Latin, and a Latin grammar, and to educate himself in a difficult subject.

One of the strange stories of American botany was furnished by the discovery, in 1765, of the tree known as the Franklinia by John Bartram, early American botanist. Bartram made the discovery while collecting plant specimens near the Georgia river now called the Altamaha—then known as the Alatamaha—and no specimens of *Franklinia alatamaha* have ever been discovered growing naturally since then, with one exception back in 1790. Illustrated at left are the leaves and the showy blossom of *Franklinia.*

Then began many years devoted to travel and study, during which time he made numerous collecting trips through the wilderness areas of Virginia, Georgia and the Carolinas. Through his friend, Peter Collison, he collected seeds and plants for the lords of England, and he corresponded with many of the famous botanists of Europe, among whom were Linnaeus of Sweden, Dr. Gronovious of Holland, and Dr. Dillinius, Mark Catesby and Sir Hans Sloane of England.

Among the plants he discovered were the shooting star, the trillium, the showy lady's-slipper, the American lotus, and the sensitive pea. But his most notable discovery was the tree, *Franklinia alatamaha.* In the autumn of 1765, while collecting near the Altamaha River in Georgia, he came upon a strange tree that was in flower. The blossoms were like those of the camellias and the tea plants of Asia. In 1773, Bartram brought seeds and cuttings of this tree out of the woods and planted them in his garden near Philadelphia. In 1790, Dr. Moses Marshall also reported finding this species, but no one has ever again found it growing in the wild. Specimens derived from John Bartram's original cuttings can be seen, however, in horticultural gardens in the vicinity of Philadelphia.

What was the exact location of Bartram's original tree? How did it happen to be growing in the wilderness of Georgia? Were there many of these trees in the same or neighboring localities? If so, what became of them? These questions have never been answered. *Franklinia,* named for Benjamin Franklin, remains one of the great mysteries of American botany.

Plants take on new meaning for the person who knows their stories. The sight of a grove of Douglas fir trees brings to mind David Douglas, the young Scotch gardener who was sent by the London Horticultural Society to Fort Vancouver and the Oregon country to collect plants that might be suited to the gardens of England, and how he spent years in the wilderness enduring all manner of hardships and privations. The Indians thought he was crazy, calling him the "man of grass," and he traveled more than 7000 miles on foot and by canoe collecting hundreds of plants and seeds to start on their long way back to England. In 1834, after ten long years of wandering, he started home by way of the Sandwich Islands—later the Hawaiian Islands—and the East; but, while botanizing on one of the islands, he fell into a large pit used by the natives for capturing wild mammals, and met an untimely death. But today English gardens are graced by many a native Oregon plant, like the beautiful holly-like shrub called Oregon grape, the heath-like salal, the beautiful madrone trees with their bronze leaves and satiny, reddish bark, and the magnificent Douglas fir.

A walk in a virgin forest of Douglas fir is an experience that few will forget. Massive specimens, six to ten feet in diameter, tower upward two hundred feet, casting a subdued, eerie, dancing light through seemingly endless corridors of solitude. Could there be a more fitting memorial to a man who loved Nature; who feared none but God, and who did his task so well?

AUTUMN

The leaves on silent currents slowly ride
To where their colors frame an autumn scene.
Turning they fall—a never-ending tide,
Scarlet and olive green.
Their veins are filled with color never seen
Until they bloomed while dying. Living-dead,
These crowns are circling, searching for a queen,
Olive and scarlet red.

Norman M. Davis

Gastrotheca, the Pouched Frog

By JOHN and MYRA MEHRTENS

This is the larger, female *Gastrotheca* intently watching a worm dangling a few inches away. Visible are the flattened toe discs, which are employed in climbing, jumping, and grasping.

FOR MANY naturalists the old adage about great things coming in small packages holds a special significance. A case in point might well be a small pasteboard box that we received not long ago. This little package, hurriedly opened, disclosed a handful of damp moss and three small but quite special frogs. We were being introduced to another strange animal from the jungles of South America—the pouched or marsupial frog, *Gastrotheca marsupiatum*, of Ecuador.

Installed in an aquarium properly prepared with a small pool of water and moss and sticks for climbing, our new arrivals obligingly fed almost immediately. They were photographed in color, and then left to settle down in their new quarters. We proceeded to investigate our zoological literature for further information. Despite the fact that we have a fairly extensive library, precise information concerning the frogs proved rather scanty. Nevertheless, we managed to learn enough to interpret future observations properly, and eventually we acquired a reasonably clear picture of these amazingly specialized amphibians.

Photographs by the Authors

There are at least a half-dozen or more species of *Gastrotheca*, all of which are confined to South America. All are arboreal creatures, superficially resembling their close relatives, the true tree frogs, or Hylidae. The habitat of the pouched frogs, although very humid, does not afford them easy access to aquatic breeding sites. This scarcity of suitable sites has probably been a causative factor in the development of the remarkable methods used by these frogs to raise their young safely.

While several species of frogs care for their eggs by carrying them on their backs—the Surinam toad and the midwife toad, for example—or even in their vocal sacs, like *Rhinoderma* of Chile, only a few have developed

The authors' pouched frogs proved themselves to be ready feeders. This species does not make use of the tongue as much as most other frogs in grasping prey, but grabs at food with the mouth.

Several quick gulps, a blinking of eyes, and *Gastrotheca*, the pouched frog, is ready for "seconds." The female below consumes approximately four small earthworms and a dozen mealworms a week.

The forceps point to the external opening of the brood pouch. Through this opening the male places the eggs within the pouch where metamorphosis will take place.

There is a considerable disparity in size, as well as coloration, between the sexes in *Gastrotheca*. In the photograph above the larger, more robust female appears at the right.

an actual brood pouch for this purpose. *Gastrotheca* is one of these.

The pouch, which occupies most of the female's dorsal surface, opens through a thickened lip-like fold of tissue. It is through this opening that the eggs are placed in the pouch, presumably by the male after fertilization has taken place. The eggs remain within the pouch for varying lengths of time, depending on the species. Most interesting, however, are the species in which the entire metamorphosis of the young occurs within the pouch. As might be imagined, the pouch becomes rather crowded with the rapidly growing brood.

Another amazing specialization prevents the death of the larval frogs by strangulation. The delicate external gills common to all larval amphibians are, in this case, situated at the end of a filamentous tube and completely protected from crushing by an umbrella-like covering. Oxygen is obtained through the skin of the pouch walls, probably by osmosis. An ample supply of yolk supplies nourishment.

An English herpetologist has reported breeding these frogs in captivity. We, of course, are hoping to do the same. Prospects look bright, for the males are swelling their throats often, making their presence unmistakably known. The call, a resonant *krrr runk kunk*, occasionally makes sleep a fitful thing, but with the possibility of some home-grown *Gastrotheca* in the offing, the calls become a pleasant and welcome sound.

MILKWEED MAGIC

If you should pluck a milkweed pod
In summer when its stem drips cream
And press your thumbs along the seam
To force it open, what an odd
Enchanting sight would meet the eye:
A tiny fish, as moist and frail
As April cloud, each pure white scale
Laid on in perfect symmetry.

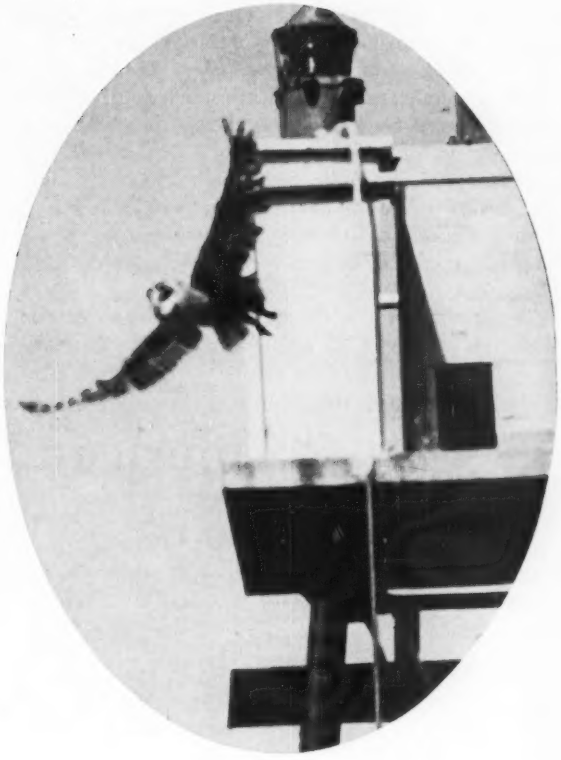
But left untouched to drink its milk
The pod grows dry and opens wide,
Revealing no small fish inside
But delicate balloons of silk!
Seed-ballasted yet gossamer-sheer,
Each rides the wind and drops to earth
Its loosened seed to start the birth
Of tall green milkweed plants next year.

How rich the artistry of God
Even in a milkweed pod.

Ruth Seymour Vesely

Specter of the Lighthouse

By IVAN R. TOMKINS



In the gathering darkness of evening a shadowy form sallies forth from the old lighthouse to seek out and carry away its victims.

On Cockspur Island, at the mouth of the Savannah River, there is an old lighthouse that was once a part of the range system that helped ships to navigate the river. Many years ago people used to live in the rooms below to keep the light burning and to care for other lights along the river, but the lighthouse has long been abandoned. The windows are broken, a chimney has toppled through the roof, and all is desolate now, a fitting haunt for the spectral being that is seldom seen except as a shadowy thing at dusk or as a silhouette in the moonlight. The specter may be heard to sound a wailing scream or a burst of unintelligible gibberish. It sallies forth under the cover of darkness and seeks out its victims, stabbing them with its sharp instruments and carrying them away to be devoured at leisure in the secrecy of a well-hidden lair.

You will probably suspect that this is no unearthly being, but one of flesh and blood, bearing the all-too-prosaic name of barn owl. Seldom will it be seen by daylight, unless it is flushed from the nest, which is a corner in some old house, steeple, or barn loft—or even in a steel box under the range lights of the river. Sometimes you may find the bird asleep in the leaves of a palmetto, or dozing on some matted grasses in the marshes. But there is little to connect it with the bird of the old tower in such a case.

In the daylight we may see, if we are fortunate, the peregrine falcon stooping at its prey; the harrier slowly quartering over the marshes and dropping swiftly on some small creature; or a Cooper's hawk swiftly driving under the cover of the woods, all seeking their own food in their own distinctive ways; but it is rare indeed to see a barn owl as it hunts. Yet it succeeds well in finding enough for its needs, even when its base of operations is in the middle of a city.

Once, on a dark night, we rowed close to shore beside the old brick tower on Oysterbed Island, and heard an animated series of clicks and chatterings from at least two individuals. "There," my companion said, "that sounds like a man having a quarrel with his wife." A couple of months later, on the day before Christmas, I climbed the steps to the old brick tower and found two white eggs in the corner, with the bones of small rodents all around—a fit setting for this stealthy hunter.

Carefully picking my way over the fallen plaster and other debris in the tower on Cockspur, I came to the small room under the platform that once held the beacon. It was literally carpeted with bones, skulls in part or whole, and all the odds and ends of skeletons that were indigestible. Having no container, I tied the corners of my handkerchief together and loaded it with the unsorted animal debris, to be carried home for examination at leisure. In that package I found more than a hundred skulls in part or whole, mostly of the black rat, with one bird skull that might have been a kinglet and others possibly of a small warbler, plus those of a few house mice. The black rat is abundant everywhere about the marsh edges and in the trees, even living in the low dunes across the river. It makes leaf nests in the trees in summer, and will invade an attic as readily as a flying squirrel. In fact, this color phase was long considered distinct, and was called the roof rat from its tendency to leave the ground like a squirrel.

Why did this particular owl—or family of owls—prefer to seek out this species when the marshes are full of rice rats, and where, on dry land, the house mouse swarms? Perhaps it was due to a hunting pattern peculiar to those individuals, for other places have

yielded the remains of other rodents, and even indicated a liking for birds, in some cases. The owl shown in the picture seemed to sit just inside its box and pick off red-winged blackbirds or tree swallows that were perching within striking distance. I have found decapitated birds just inside the box, in the morning, much too freshly killed to have been taken the preceding night. Another old chimney yielded the remains of a cowbird, a species not seen within several miles of the place.

To the ornithologist the great interest lies in the bird itself—its manner of life and feeding—but to the mammalogist the food remains often give information on the species of rodents that live within the range of the owl. There have been cases where a family of owls found small rodents that the mammalogists could not find. However, the food remains can not be called a cross-section of the mammalian population, because of the selectivity of the owls.

No doubt there are other photographs of a barn owl in flight, but they must be rare. The photograph accompanying this article was a stroke of luck; this particular bird was prone to stay in its box in the daytime, and thus could be approached with care.

"American Beauty" Tree

By RUTH H. DUDLEY

Photograph by Edna Hoffman Evans

Showy, creamy white blossoms and leathery, dark green leaves make the southern magnolia a favorite in temperate climates.

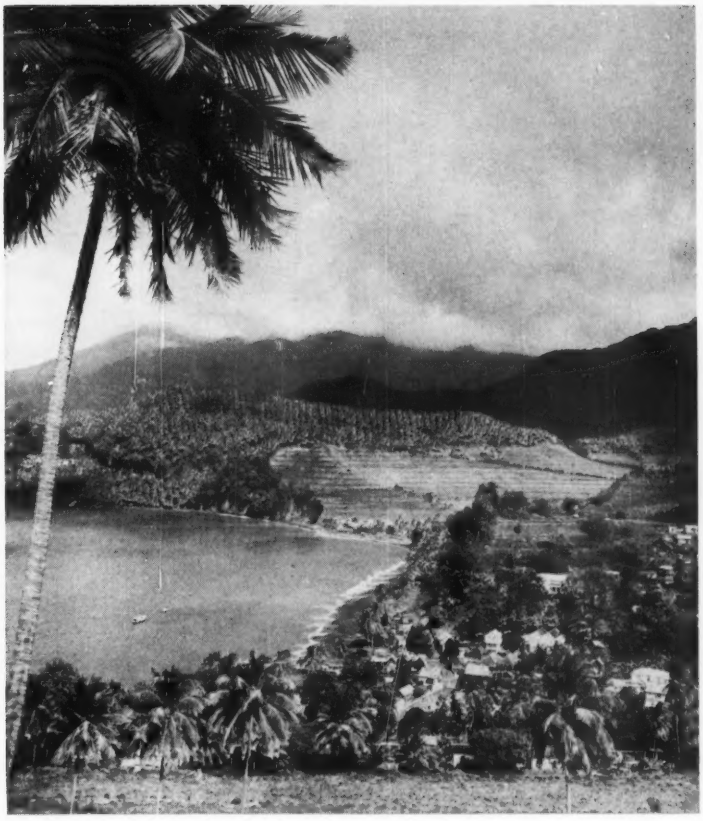
ALTHOUGH you probably have never used magnolia buds to flavor your rice, as the Chinese do, the chances are you have thrilled to the perfection of the magnolia blossom. The magnolia is considered one of the most beautiful trees in America, so perhaps it might be well called the American Beauty tree. Two States—Mississippi and Louisiana—have chosen the southern magnolia, *Magnolia grandiflora*, as State trees, and the blossom is the State flower of both.

Everything about the magnolia is superb. It is an evergreen, well-shaped, and from sixty to ninety feet tall. The leaf, plain oval in shape and smooth-edged, is the simplest type of leaf to be found on any tree. The leaves are large, from five to eight inches long, from two to three inches wide, and so thick that they feel like leather. They stay on the tree for two years. Top-side, they are such a shiny, dark green that they fairly flash in the sun. Underneath, they are soft and downy, with a rusty brown color.

In May, the huge buds at the tips of the branches begin to open. Soon fragrant blossoms appear, opening one after the other, and prolonging the flowering period well into summer. The blossoms are exceptionally large, seven to eight inches across, with six to nine (or even twelve) thick, waxy petals. Creamy white, they have a bright splash of purple at their bases, and look for all the world like water lilies that some mischievous elves have placed among the green, glossy leaves. In the fall, the red and brown cone-like fruit opens, and scarlet seeds dangle on long, slender stems.

The magnolia is at home in the warm southern sections of the United States. It grows naturally from the southern part of North Carolina to Florida, and west along the Gulf States to eastern Texas. It makes a showy ornamental in other parts of the country, also, doing well where the weather is not too cold, as far north as Philadelphia, and in the western parts of Oregon and Washington. It is a favorite in California, where often you may see it lining streets; and other countries also have adopted it.

There are several species of magnolia in the United States, and the wood is used for furniture, venetian blinds, woodware, flooring, crating, and the like. Commercially, it is a useful tree, but the magnolia is known best, to most of us, for its flowering beauty.



St. Vincent Island, in the Caribbean Sea, furnishes the world with a large part of the arrowroot starch of commerce. The arrowroot plant, *Maranta arundinacea*, grows on the slopes of mountains running down to the Atlantic. In the middle foreground of the photograph is a banana plantation, while nutmeg, cocoa, ginger and breadfruit also flourish on the island.

"Arrowroot" Island

By LYN HARRINGTON

Photographs by Richard Harrington

The manager of a St. Vincent arrowroot starch factory poses, with a handful of roots, beside a map of this West Indies Federation island.

ST. VINCENT, a tiny island in the Caribbean Sea, supplies virtually the world market for arrowroot starch. This fine powder brings premium prices—and sometimes adulteration—in what is frequently labelled "arrowroot" in our stores. Only under a microscope can you discern the difference between arrowroot molecules and those of potato, corn, rice or fine sago.

Our usual introduction to arrowroot is in baby biscuits, although only a small portion goes into their manufacture. Of the 40,000 barrels—4000 tons—produced yearly in St. Vincent, more than half is shipped to the United States for use in digestive biscuits, ice-cream, as a candy base, dextrin, and even for textile stiffening.

The island, named by Columbus on St. Vincent's Day in 1498, is a 150-square-mile island in the Windward group. Its sandy soil is fertile, enriched every century or so by volcanic dust when Mount Soufrière "blows its top." (The last time was in 1902.) Most of the arrowroot acreage is on the windward shore, on mountain slopes running down to the Atlantic.

From its earliest settlement, St. Vincent has had a botanical

The application of sufficient energy can make an efficient tool of the old-fashioned mattock, or heavy hoe. Here a harvester hacks the rhizomes of the arrowroot plant from the light soil with a mattock. The white rhizomes, with many fine hair-roots, look something like the familiar roots of the horseradish.

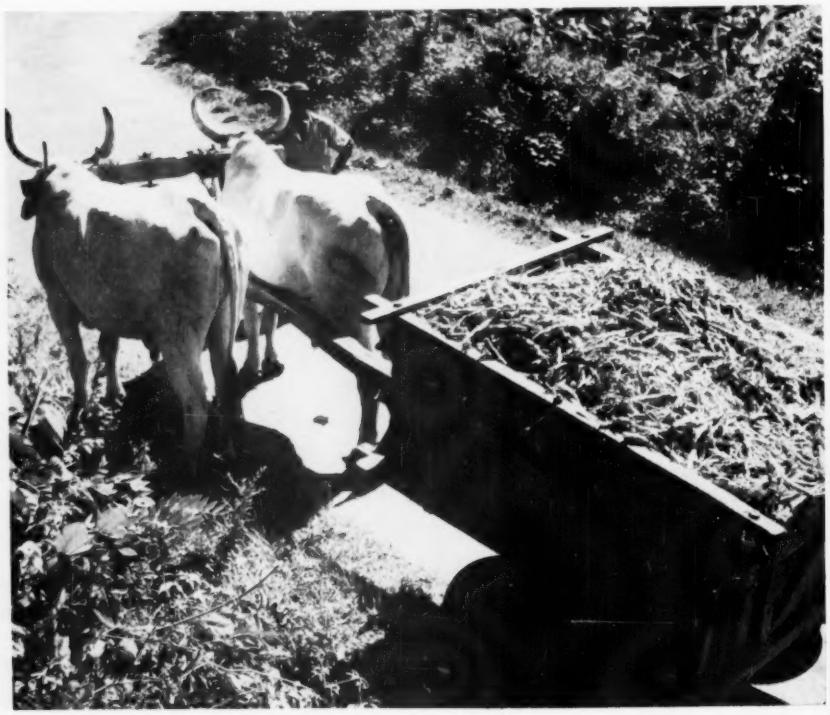
garden and experimental plots that supplied exotic imports to the nearby islands. Nutmeg, cocoa, bananas, ginger and—not least—the breadfruit trees brought by Captain Bligh on his second voyage have flourished on St. Vincent and supplied cuttings to other islands.

But not arrowroot. Although the plant is indigenous to South America and was brought to St. Vincent originally by the invading Carib Indians, it seems reluctant to grow on other islands of the Caribbean. Arrowroot grows in some other tropical regions, like India and northern Australia, while the island of Madagascar produces a small quantity for commerce.

The Caribs were warlike Indians, migrating northward over the island stepping-stones from South America, and they brought some of their familiar foods and remedies with them. Arrowroot served both purposes. They used the freshly dug rootstock as an antidote for poisoned arrow wounds, and whether the present name came from this use, or from the shape of the roots—or is a derivation of the Indian word *ara*—is still debatable. The botanical name of this plant, however, is *Maranta arundinacea*.

Like the potato, the arrowroot is a perennial, and grows thick, fleshy stems about two feet high. On St. Vincent planting begins in June, the end of the rainy season, and four months later the plant puts out small, white flowers that in turn become currant-like fruits. The rhizomes now begin to thicken and store up starch, while the foliage shrivels. By ten or eleven months, the starch content is at its peak.

The windward coast is dotted with small factories where the starch is extracted. Some are efficient up-to-



On older estates, arrowroot rhizomes are thrown into ox-carts to be hauled to the factory; a method of transportation that has given way to the motor truck on some of the island's arrowroot plantations.

From a dump near the starch factory door, a worker fills a woven basket with arrowroot rhizomes, which will be washed, peeled and pulped, and then strained to remove the fiber. Research workers are trying to find a use for this fiber, which still contains a certain amount of starch, but which is presently discarded as useless.

date plants, others require more hand labor. The growers market their produce cooperatively as the Arrowroot Association.

The rhizomes, however, all are harvested the same way. Crews of men equipped with mattocks hack the roots out of the light soil. The white rhizomes, with many fine hair roots, look rather like horseradish. They range from six to twelve inches long, although an occasional root may reach twenty inches. Usually the roots are less than an inch thick, with a scaly covering that has—to the author's taste—a disagreeable flavor.

The workers grub the roots from the ground and toss them into truck or ox-drawn cart. At the factory they are washed, peeled and pulped, and strained to remove the fiber, which is discarded. Research men are trying to find an economical use for this waste, which is called "bittie." It can be converted into glucose or laundry starch, but at prohibitive cost.

The crude starch, twenty-six percent of the root, passes through the sieve. When the starch settles, the water is drawn off and the starch forms a cake, which is dried on wire racks in the sun and wind. In the central

This great dump of arrowroot rhizomes outside a starch factory on the windward side of St. Vincent Island will furnish part of the more than 4000 tons of arrowroot starch that are exported from the island yearly.

After being washed, peeled, pulped and strained, the arrowroot has been reduced to a starchy liquid, which, on settling, forms into a cake. When the cake has dried, it is broken up and the pieces placed on wire racks to dry further in the sun and wind. In the more modern starch factories this last drying process is accomplished with the aid of steam.

factory of the Arrowroot Association the pulp, suspended in water, flows slowly through shallow troughs until the starch settles, and is then dried by steam.

St. Vincent arrowroot is considered particularly pure, and the Association is determined to keep its standard high. The bags from the factories are tested for quality, then barrelled in 200-pound lots for shipment. Lighters carry the product out to freighters standing in the roadstead. Indeed, it is the shipment of arrowroot starch that keeps the ships coming to St. Vincent, for the demand exceeds the supply.

Other crops like bananas fetch almost as much money, and require much less effort. Bananas swathed in plastic bags go abroad the freighters, too; but it is arrowroot that sustains the economy of the 80,000 people on this island of the West Indies Federation.

The arrowroot starch now is ready to be powdered, after which it will be bagged, tested, and put up in 200-pound barrels for shipment. A close check is kept on the purity of the product, as the members of the St. Vincent Arrowroot Association are determined to preserve the island's reputation for a particularly pure product.

The giant cattle scorpion of South America is a vicious species that measures ten inches from stinger to claws. Attaching itself to the bodies of unfortunate cattle, it brings death in but a few minutes.

More "Insect" Discoveries

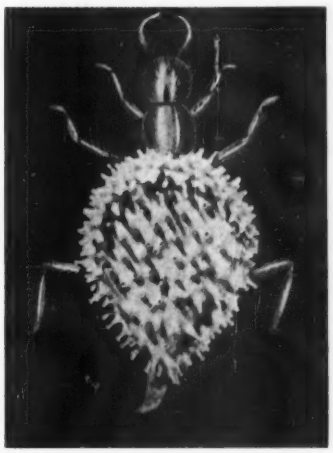
photographed expressly for that eminent explorer of South American jungles, Dr. Adolph C. Bhugnatz, Ph. X., A. V. D., by

WILLIAM D. BARKLEY

The Amazon fish shark, about six inches long, is equipped with two reversely-barbed stingers which, once inserted, are most difficult to remove. It feeds chiefly on the livers of young corkscrew fish.

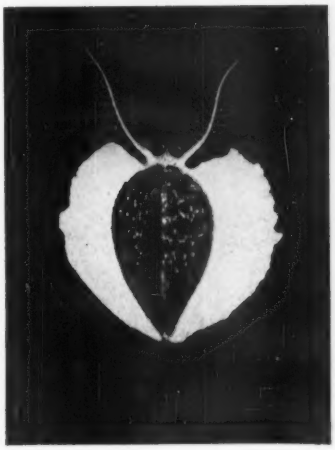
WHEN the first copies of *Nature Magazine* for June and July, 1957, began to arrive at their destinations, a ripple ran through the world of zoology. For it was in this issue that the remarkable "insect" discoveries of Dr. Adolph C. Bhugnatz (then merely Ph.X.) were first brought to the attention of layman and scientist alike—discoveries that had been made during two years of patient investigation in the jungles of South America. (*Steaming* jungles, we are told, is the proper phrase.)

Dr. Bhugnatz has, since then, both been praised as a leader in the field of entomology and condemned as a fabricator and a fraud; but he has not allowed either praise or criticism to interfere with his scientific work. On this and the following page we present without further comment the results of Dr. Bhugnatz' second jungle expedition, the results of which are here faithfully recorded by the camera of Baltimore artist-photographer William D. Barkley. Mr. Barkley says that he has no prejudice in the matter—he knows only that cameras record just what they see.



A cross between the spider and beetle is the h o u n d ' s - t o n g u e speedle. Fearsome in appearance, this insect is nevertheless quite harmless. It is a rare species that feeds on decaying animal matter.

Almost all animals are hosts to some body parasite or other. The llama of South America is no exception, and the ruff-necked llama louse gorges itself on llama blood until swollen to a great size.



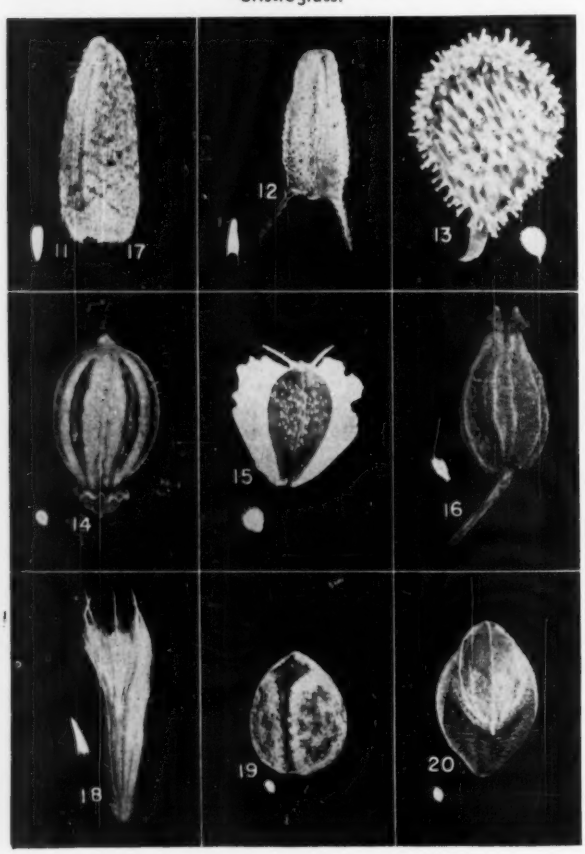
About the only claim to fame of the mammoth moth, *Arctium gigantus*, is its great size. With a wingspread of seven to eight inches, the mammoth moth often resembles a large bird in flight.

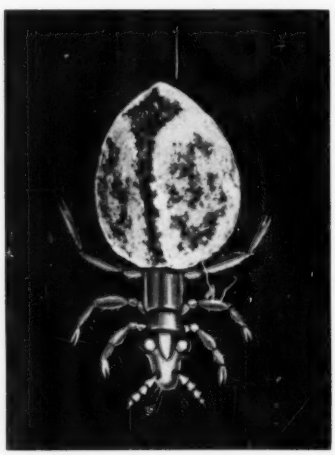
The split-head beetle, *Duo cranus,* actually does not have two heads. The illusion stems from the fact that this insect's mouth is placed vertically instead of horizontally, making feeding fun.

The white-winged fruit moth, often measuring five inches across the wings, is a beautiful species with snow-white wings and a deep red body. It is detested by farmers as a destroyer of fruit.

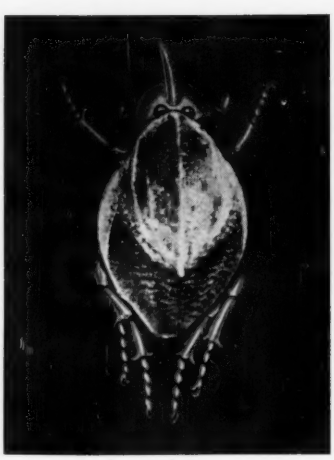
Armeria spinus, the parachute moth, is wingless. It employs its umbrella-shaped appendage of five membrane-covered spines as a sort of parachute, and thus floats from place to place on the breeze.

Just before press-time, when it was too late to make substitutions, your editors received word that both Dr. Bhugnatz and his "insects" are wholly fraudulent, and that photographer William D. Barkley concocted the little monsters from the seeds of various plants. The seeds, shown below both greatly enlarged and slightly less than actual size, are: 11 and 17, wild sunflower; 12, beggar's-tick; 13, hound's-tongue; 14, water hemlock; 15, winged ironweed; 16, anise; 18, armeria; 19, flowering spurge; and 20, yellow bristlegrass.

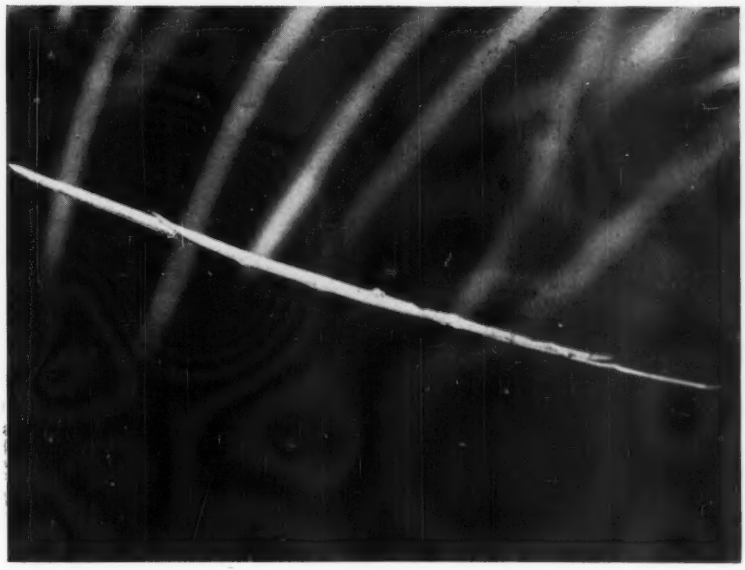




Chief weapon of the spurge beetle, *Euphorbia stinkus,* is an extremely offensive odor. Dr. Bhugnatz, before taking this insect, was firmly convinced that he was about to capture a spotted skunk.



The eating habits of the bristlegrass cutter, *Setaria cuttus,* are somewhat similar to those of the twist-tail wheat hopper. (*Nature Magazine,* June-July, 1957, page 309.) It exhibits a preference for the juices of the bristlegrass stem.



A most unspider-like animal is the Australian whip spider, *Ariamnes flagellum*, which spends the daylight hours with its legs held rigidly in line with its narrow, twig-like body.

Private Life of a Whip Spider

By NOEL L. ROBERTS

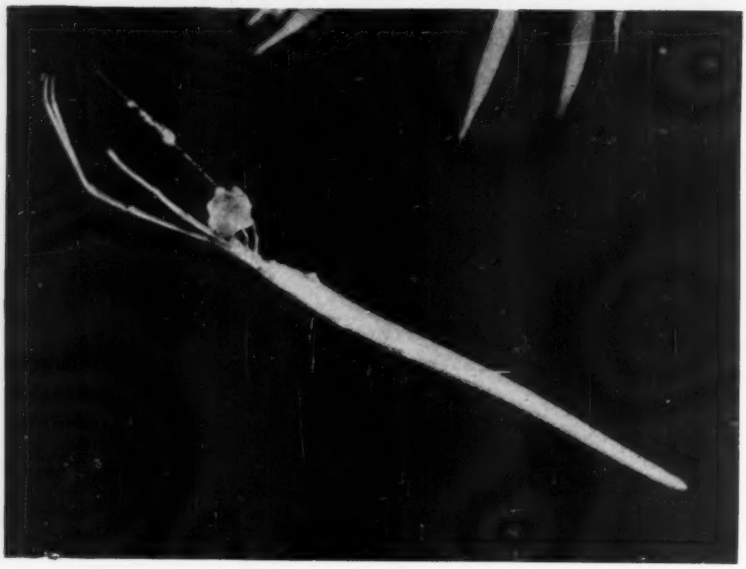
Photographs by the Author

FINDING your spider is certainly the first and most difficult step in spying on the personal affairs of the Australian whip spider. Scientists know this remarkable creature as *Ariamnes flagellum*, and the "flagellum," or "whip," part of the name aptly describes the long, tapering body. It would be hard to beat in a competition for the most unspider-like spider, especially during the daytime when the legs are held rigidly in line with the narrow, twig-like body.

Having located *Ariamnes*, I sometimes show visitors the bush in which she is suspended on the finest of silken lines. They invariably fail to find her, and hardly believe their eyes when the touch of a finger disturbs her twig-like pose. "But it doesn't look a bit like a spider," they say.

At night this protective pose is abandoned. *Ariamnes* must eat—and eating means action. From a cluster of spinnerets on the upper part of her body two or three fine lines are pulled out, and then a longer line drifts away until it is caught on some part of the bush. There

The touch of a finger disturbs the whip spider in its daytime twig-like pose. The simulated twig becomes animated during the hours of darkness, for *Ariamnes* must eat, and eating implies action.



Ariamnes makes no attempt to build a web, but lets a long "line" drift away until it is caught in some part of her bush. Having a tiny mouth, the Australian whip spider eats only tiny insects, which it catches on the single thread and wraps in fine silk.

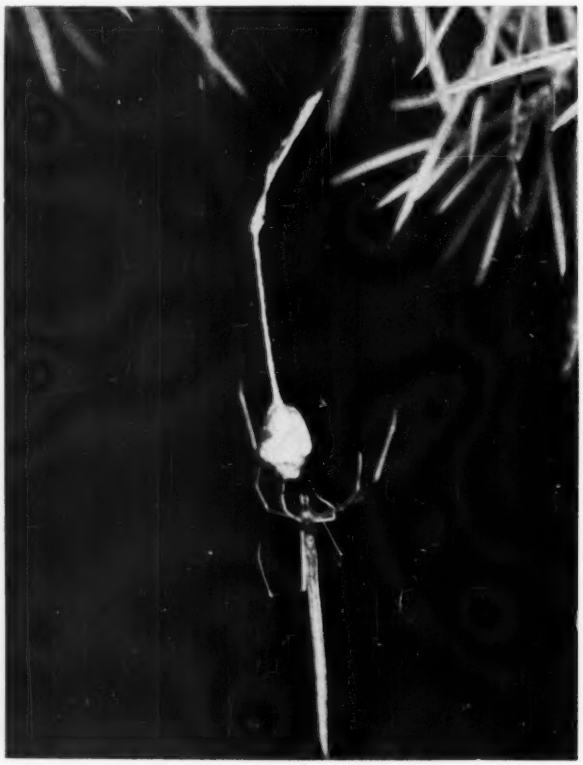
is no attempt to make a web, and this frail, sticky line is her only means of livelihood. She waits with the greatest patience until some tiny insect blunders into it, then walks along to her captive and wraps it up in silk. It would be interesting to know whether this fine line has some special attraction for insects, for few spiders depend on so precarious a snare.

The whip spider assumes an upright position at night, and if disturbed seeks safety on a branch holding one of the line attachments. Speed is never her strong point, and she is not nearly as timid as are most spiders. As a parent she shows maternal instinct, of a sort, by some concern for her egg-sac, which is roundish, mottled cream and brown and attached to a twig by a thick, white strand of silk about one and one-half inches long. It also is anchored firmly below, and is able to withstand a surprising amount of wind pressure.

There is a world of difference between the tough, protective cover of the sac made by the whip spider and the fine filaments she spins for snaring insects. And the fluffy silk in which she deposits her few eggs is quite different again. One sac I opened had only four eggs. According to students of the subject, this means a high survival rate. So, despite her feeble physical equipment and sluggish mode of existence, the whip spider manages to hold her own in the grim business of hunting and being hunted.

Incidentally, *Ariamnes* has an Indian relation with the same kind of body. But it is green in color, with pretty silvery and yellow-brown markings that make it resemble a caterpillar quite closely.

I have never found the whip spider in my garden in winter. But she must shelter somewhere in it, for every summer this parody of a spider is back again, playing the same old camouflage trick and trying her luck with a fishing line almost too fine for the human eye to see.



The Australian whip spider spends much time in contact with her roundish egg-sac. One such sac opened by the author contained but four eggs, a circumstance that would seem to indicate a high survival rate for the species.

Control of Birds

Recently we were invited by the U. S. Fish and Wildlife Service to attend a "Conference on Bird Control." We went, with some doubt and considerable curiosity. It turned out that both the problems and the bird species involved were widely separated, ornithologically and geographically. One was the effect of blackbirds upon agricultural activities; the other involved the relationship of albatrosses to airplane operations on Midway Islands in the Pacific.

"Blackbirds," (which was used collectively for redwing and yellow-headed blackbirds, crow blackbird, cowbird and grackle), when concentrated in numbers, are reported to be causing significant losses in corn, rice and other grain crops at crucial times of growth. Bird depredation is, of course, as old as agriculture, although changes in land use patterns and agricultural practices have increasingly served to complicate and accentuate the problem.

As a consequence the Fish and Wildlife Service has found itself caught between demands from the farmer for control and the fact that most of the species involved are protected under the Migratory Bird Treaty Act and pacts with Canada and Mexico. The meeting was told that research is being devoted both to methods and techniques of control, as well as means to discourage the birds without harming them. Large-scale destruction, even if feasible, it was said, would inevitably increase insect damage; poison bait is dangerous to other wildlife, as well as man; trapping and netting have not proved successful; repellents have not yet been adequately explored. And, all in all, funds for sufficient and continuous research have lagged far behind the need.

What the Service was seeking to determine was the reaction of those present to its issuance of permits for control in such terms that permits would protect the controller in the event that other protected birds were accidentally destroyed. There is no doubt that concentrations of the birds at certain times of year do have serious economic significance to farmers, who are entitled to some relief. But, since knowledge of how this relief can be supplied is still imperfect, it seemed to us rather academic to be too much concerned about the legal aspects. We are willing to leave the decision to the Service, but we do dissent from one bit of thinking that did appear at the meeting. This came from a spokesman for State fish and game people, who seemed to see an opportunity to place on the gamebird list a number of additional species. Informed men present, however, indicated that such a device would have little or no value in control, and we registered strenuous objection—and do so again—to such an opportunistic course.

Travelling to the Pacific at the afternoon session, we were first treated to a pretty bald piece of propaganda film designed to show the Navy's plight due to the albatrosses on Midway Island. This was followed by a considerably more factual and scientific presentation of the problem.

The U. S. Naval Air Station on Midway is an important base and vital link in our outer protective system. It is also a base for about one-third of the world population of Laysan albatrosses, and considerable numbers of black-footed albatrosses and sooty terns. The Laysans are comical and ingratiating birds, beloved by ground personnel and despised by flying men; awkward on the ground but beautiful as they soar in the air, which is where the problem lies. We have been flying in and out of Midway since 1942, and while there have been no crashes or fatalities due to the birds, there has been much damage from many strikes between birds and aircraft, with considerable attendant expense and grounding of planes, and ever-present human hazard.

Faced with this situation, and hoping for a solution that would not injure the birds, the Navy sought and received the cooperation of the Fish and Wildlife Service. Outstanding biologists have made studies for several years, one of the most interesting being reported in "Birds and Aircraft on Midway Islands" published as Special Scientific Report: Wildlife No. 44. This and other reports seem to add up to the conclusion that there is little hope of changing the habits of the birds. Also, mass destruction of some 30,000 birds proved of little use in reducing the hazard.

Studies, through banding and other devices, show that the young birds go to sea and stay there for about four years, returning when mature to nest, if paired, or just to hang around as "unemployed" birds. The air strips and station are on Sand Island, as is the concentration of birds. Nearby Kure Island offers a possibility as an alternative nesting place but involves clearing away much of the low-growing shrub to provide nesting place. Even then, it is a question whether birds could be attracted there. Apparently the Navy shares that view, for it is now its intention to eliminate the Laysan albatross entirely from the island over a span of seven years as returning birds come back each year.

The black-footed albatrosses and the sooty tern appear to offer a much less serious problem and may largely be spared. However, the Navy spokesman suggested that they, too, might be a problem in the jet age, birds being sucked into jet engines. In view of the extensive tests that have been made as to the jet ingestion capacity of these engines, we are inclined to think that this is being over-emphasized by the Navy in support of the drive against the Laysan albatrosses.

However, sad as it is, it appears, on competent scientific authority, that one has got to go—the albatrosses or the air base. Until mankind can learn to beat his aircraft into easy chairs, we fear the Navy's proposal is likely to prevail.

In the field of modern botany,

You Can Be a Plant Detective

By SARA ZIMMERMAN

MODERN science has furnished us with a host of new fields to explore, and the tools with which to explore them. The men and women who travel these untrodden avenues constitute what we might call our "natural" detective force; and, like true detectives, they are constantly finding new ways of keeping up with the quarry.

This is not a detective story. Rather, it is a story *about* detectives—those Nature detectives who have been responsible, mostly in the past few decades, for some spectacular changes in the field of commercial and ornamental botany.

From a distance, the lights of this field near Whittier, California, might suggest a night baseball game in progress. Actually, row after row of China asters are receiving supplementary night lighting, a proved way of carrying the plants beyond their ordinary blooming time.

Throughout the country hobbyists, as well as students of Nature, have been conducting experiments in soilless nutrient feeding, chemical reinforcement of the soil, and artificial lighting that forces green growth and earlier bloom in plants. A friend tells me about being invited by a youngster to behold the sight of tomato plants abloom in a bathtub. Another acquaintance boasts of "putting something over" on Nature by conducting her African violet business from an unused basement with only a block of fluorescent lighting to show on the expense account. A neighbor makes his own cigars, growing his own tobacco in his back yard with soil blended with carefully prepared ashes.

Near Sanford, North Carolina, there is a spectacular glass cathedral that is a veritable "flower factory." This is Carolina Wholesale Florists, Inc., that does a profitable business in turning out prize chrysanthemums on a schedule of a thousand blossoms a week throughout the year. Ex-G.I. Tommy Forbes, its founder, will tell you that his "business secret" is vermiculite, a variety of the mineral mica, which, after being heated to some 2000 degrees Fahrenheit, expands tremendously, to become a near-perfect conductor of chemical nutrients for plant roots.

In a village of Quonset-like huts near Winchester, Tennessee, the junior-sized ornamentals made famous by the Templeton family flourish under special conditions of temperature and moisture to achieve fantastic yearly growth, while near Whittier, California, long lines of night lights over an open field do not signify a baseball game in progress, but rather constitute a proved way of carrying the famous California China asters past their ordinary blooming season.

Behind closed doors, scientists labor for the perfect rose, the white marigold, and the scented orchid. In the "greenhouse" sections of our atomic laboratories, radioactive isotope tracer techniques are being used to delve into Nature's plant secrets. The first atomic flower patent—a mutation red carnation turned white by radiation treatment—has been presented to the Atomic Energy Commission.

Phytotektors, the plant-makers; cytogeneticists, the creators of new plant strains; and pathologists and chemists are providing pest and disease counter-agents, growth inhibitors, heredity changers, and new medicines like penicillin and streptomycin. You need only to read a book like *Modern Gardening*, by Dr. P. P. Pirone, pathologist at the New York Botanical Garden, to realize that today plants are almost as much "per-

sonalities" as humans, subject to the plant equivalents of headaches, heart attacks, viruses, and diseases of the nervous system.

Let us consider the millions of amateur gardeners of suburbia who nowdays happily employ their new-found leisure with dibble, grubber and plant shears. This is no inarticulate segment of the army that is laboring to make changes in our green scenery. These people demand the best methods, up-to-the-minute statistics, and the "right" to compete, garden-wise, with like-minded neighbors. They are exhorted to "brighten up the premises" and to march forward in the name of community spirit, and they heed the order with enthusiasm.

This army of plant enthusiasts contributes to a yearly business estimated at more than a billion and a half dollars, the average home owner spending ninety dollars a year on his grounds. This dollar estimate covers hardware, fertilizers, fungicides, grass, flower and vegetable seeds only, and does not include items like topsoil, humus, peat moss and shrubbery. Little wonder that the country's nurseries are said to laugh at talk of depression!

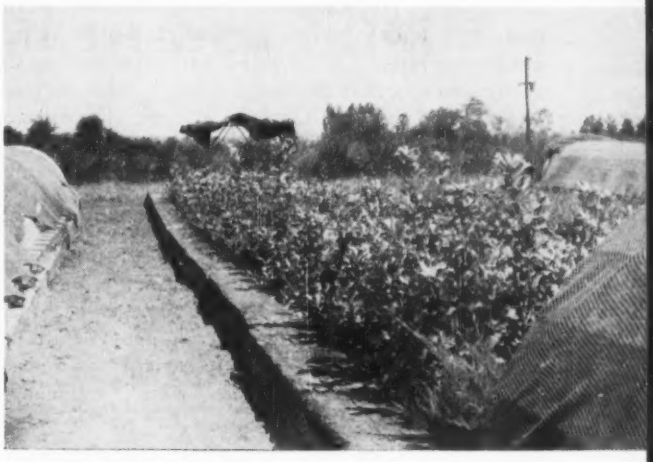
"Why do some plants bloom in spring and some in fall?" This was a question that puzzled plant scientists until 1920, when Allard and Garner, two research men in the U. S. Department of Agriculture, made known the "law of the photoperiod."

The law of the photoperiod divided plants into three classifications. Those requiring twelve or more hours of daylight for their blooming cycle are known as long-day plants; the China aster, for example. Plants requiring seven hours or less of daylight are known as short-day plants, of which an example is the chrysanthemum. Neutral plants are not dependent on any fixed light requirements. Today, plant growers put the law of the photoperiod to work producing more blossoms per plant for earlier markets. They simply provide additional lighting.

Dr. Liberty Hyde Bailey, founder of the hortorium at Cornell University in Ithaca, New York, was one of the first "moderns" to experiment with artificial light for promoting plant growth and controlling blooming time. Three reports from Cornell, dated in the eighteen-nineties, tell of experiments with arc lights above and inside greenhouses. F. W. Rane, assistant to Dr. Bailey, was first to employ the now-familiar term "electro-horticulture."

Early problems in the use of such artificial sunlight for speeding up plant growth were fundamental. What was the right kind of light? By 1920, almost every type of light had been tried; fluorescent lighting, so popular today, came into use in 1938. Many of the devices used in connection with artificial lighting were most ingenious, and some seem humorous today. They included sparks discharged in aquarium-like containers, batteries attached to roots, octagonal screens fastened to trees, red lights and blue glass, and even, in one case, a huge gantry crane with lights attached, moved in and out of the testing room.

Under closely controlled conditions of temperature and humidity, ornamental plants make phenomenal growth records. Each of the Quonset-like huts in this "plant village" at Winchester, Tennessee, houses from eight to twenty thousand cuttings, depending upon variety.

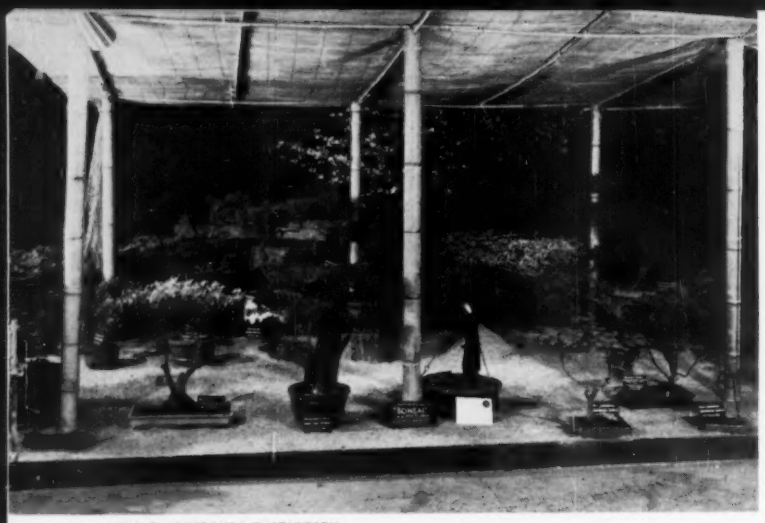


American holly cuttings three to six inches long, with two to four mature leaves, were planted in the growing huts (photograph at top) in September. By the following August the tallest of the young hollies were three feet tall, and were ready for either field transplanting or potting.

My late brother, J. Harold Zimmerman, was one of the plant detectives, and I well remember the night in 1923 when he conducted me on a tour of his own plant tests in the greenhouse at Columbia University in New York City.

Rows of plantlets, both flowers and vegetables, seemed to stand on tiptoe under their shiny metallic hoods, as though serenading the success of five hours of additional light. In the midst of his enthusiasm for his charts and equipment, my brother seemed to shed his vizor and white apron to become prophetic. "Someday," said he, "we'll be making food from the recipe provided by the plant." And he added, "We may have to, in an emergency, such as a new kind of war with whole populations forced to exist under ground."

Later, at a convention of the Illuminating Engineering Society that met at Lake George, New York, my brother



ARNOLD ARBORETUM PHOTOGRAPH

This prize-winning display of Japanese "bonsai" at the 1954 Spring Flower Show of the Massachusetts Horticultural Society should correct the notion that close control of plant growth is strictly modern. The trident maple at left is 102 years old; at its right is a false cypress aged 122; the two trees immediately to the right of the center pole are a Japanese larch 142 years old and a Japanese maple 57 years old. White pine in background is forty-seven.

addressed the assembled engineers on a new note. "Light," he promised, "may in a few years be supplied economically to the commercial grower, which will mean that crops, both vegetable and flowers, will be raised in a shorter period. There will be earlier productions in spring, and schedules met without fail." Since the cost of the experiment was tabulated and the approximate value of crop yields, too—as well as the lighting expert's knowledge of central station's operating cost—my brother's authority was accepted, and his prophecies became a way of business within a short time.

Where, you may ask, is this branch of modern science taking us? What would Asa Gray, early botanist of Harvard University, have thought were he a witness to the antics of a young scientist stripped to T-shirt in a steaming greenhouse, following the course of a rubber molecule through *Hevea brasiliensis* by tracer technique? What would Mrs. Almira Phelps, second woman member of the American Association for the Advancement of Science and author of *Botany for Beginners* (1832), have thought had she heard Dr. D. I. Arnon of the University of California announce that the little green plant engine, the chloroplast, has now been isolated? And that it is now possible to follow Nature's recipe for making food—in the test tube?

Everyone who is interested in plants may have a place in the modern story of Nature modification. You may be an amateur gardener specializing in plants that are hard to grow, or that are strange in appearance. Perhaps you experiment with ixoras from Thailand or barlerias from Hong Kong. You may be a doctor to ailing plants, or organize miniature gardens and know the disciplines of shaping trees into table pieces by way of the Japanese "bonsai." Perhaps you tend your garden from bedside or wheelchair, or are a "garden tourist," or a garden club member. In any event, the chances are good that you will fit into the new botanical science somewhere, and that you, too, can be a plant detective!

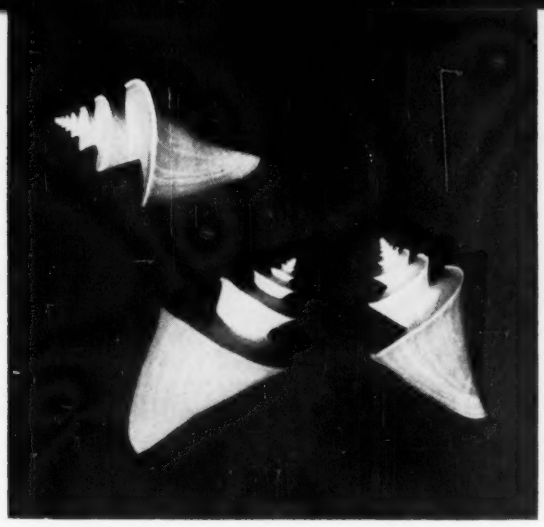
ON POSTING A BOX OF FLOWERS

Go, pale primrose! and tell
Of the wet sand and woodsy smell
Of the dim places where you dwell.

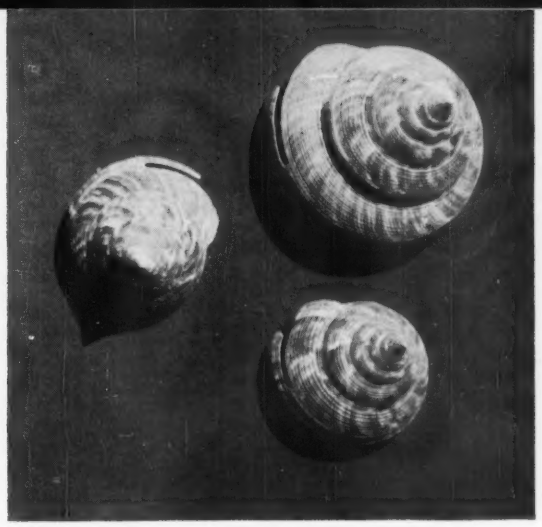
Speak, white violet and blue!
Of the lark which singing flew
From the warm bank where you grew.

Green ferns! Go, and bring to mind
Running brooks and wandering wind,
'Till the old, the lame, the blind,
Folk with worn and weary faces,
Maimed in heart, with foreheads lined
Glimpse the quiet country places
And the hedgerows celandined.

Julia Whittier Wolfe



The wonder shell commands interest and admiration, with its molded ramp, flaring form, and white interior.



Remarkable among the sea shells of the world is the emperor's top, with its curious slit near the base.

Something Special in Sea Shells

By A. GORDON MELVIN

Photographs by Lorna S. Melvin

THE two types of sea shells illustrated above are among the most admired of the sea shells of the world. The emperor's top, at the right, has a distinctive appearance that is all its own. Austere yet delicate, it is sumptuous both in size and in its reddish-brown markings on a cream-colored background. The unusual slit near the base, clearly visible in the photograph, is unique and curious. This shell is from deep Japanese waters, and was once so rare that it commanded a price of a hundred dollars or more. Even today it is a rarity, and a specimen of good color with the slit intact is worth about twenty-five dollars, and is not always available. It will make one of the central pieces in the cabinet of any collector.

The other shell, shown above at the left, is the wonder shell, also fairly large, being about four inches from tip to spire. Few sea shells command as much interest and admiration as this one. The spire looks like a superbly molded ramp ascending the heights. The body swings in a wing-like whorl, thin and delicate, and its flaring form and milk-white interior lend an air of refinement that reminds one of a fine porcelain tea cup. It is not surprising that this beauty of the sea was given the name *mirabilis*, or wonderful. This shell once brought a high price, but a good specimen now may often be bought for a little less than ten dollars.

An incident of the second World War relating to these two shells shows that shell collecting is international, and that shell collectors form an international brotherhood. Professor William Clench, of Harvard University, distinguished authority on sea shells, assures me that the story is true, and says that specimens of these shells actually saved the life of the noted Philippine shell collector, Pedro de Mesa. After the war, Mr. de Mesa presented the shells to Dr. Clench, and they are now in the Harvard shell collection.

Some years ago, when Mr. de Mesa was a young school teacher, he exchanged shells with the Japanese scientist Kuroda, the authority whose name is linked with such well-known shells as *Murex pliciferoides* and *Pecten nipponensis*. It happened that Dr. Kuroda's father was the general in command when the Japanese invaded the Philippines.

Among the people of Manila who fled into the mountains was de Mesa. Word reached him, however, that Professor Kuroda was in Manila, and was searching for him. Much alarmed, de Mesa sent his brother-in-law into Manila to make inquiries. It turned out that the purpose of the search was to make a friendly offer of a job—which de Mesa refused. He was surprised, therefore, when he received Professor Kuroda's calling card, together with two Japanese sea shells, a magnificent emperor's top labeled *Pleurotomaria hirasei*, and a superb wonder shell labeled *Thatcheria mirabilis*, like those shown in the photographs on this page. When Japanese patrols finally reached de Mesa's hide-out, the gift card and the two shells from Professor Kuroda actually saved de Mesa's life!

One need not be a shell collector to admire or own specimens of these two magnificent shells. In a Japanese home one clear space, the *tokonoma*, is left in which to display some object of great beauty, like a superb sea shell. Our own interior decorators now sometimes use this plan, and also are becoming more aware of the value of sea shells in room decoration. Unlike flowers of the garden, sea shells do not wither and fade!

The Feldspar in Your Life

By PAUL MASON TILDEN

N. H. PLANNING & DEVELOPMENT PHOTOS

From great open pits and glistening white galleries of mines like the Colony Mine at Alstead, New Hampshire, above, come hundreds of thousands of tons of crude feldspar every year for the ceramics and glass industries.

Dynamite shatters the feldspar into coarse chunks which, after removal of impurities, will be further reduced in size and eventually crushed to powder.

Perhaps this title may sound like an odd one for an article, particularly since the word "feldspar" is one likely to send many folks to Noah Webster for a bit of assistance. Yet, actually, the mineral feldspar is about as intimately linked with the day-to-day living of modern America as any product of the earth. It is with us at the breakfast table, at lunch and at dinner; it is in most of the electrical appliances in our homes; in the glass and tile of our houses, office buildings and factories, and in the scouring powders that are used to clean that same glass and tile. Feldspar has long been a prime ingredient in the manufacture of artificial teeth; and it would be difficult to get into much closer touch with a mineral than that!

This mineral makes up something like fifty percent of the crust of our earth. Almost every rock type, igneous and sedimentary, contains feldspar in greater or lesser amounts. But oddly enough, as far as users of feldspar are concerned, they find themselves somewhat in the position of Coleridge's ancient mariner, who was surrounded by vast quantities of another mineral—water—but had none to drink. Feldspar is everywhere, but only in a few places is it in concentrations large enough and pure enough to be important commercially. Even these concentrations are today being depleted rapidly by the insatiable demands of the glass, ceramics, enamel and other using industries. Many deposits are now exhausted.

Mineralogically speaking, the general term "feldspar" includes a small group of minerals—all of them silicates of the metal aluminum—that differ chemically only in their proportions of the elements potassium, sodium and calcium. Under ordinary conditions these various white or pastel-tinted mineral "cousins" are found as small grains in our rocks; most liberally in the so-called eruptive rocks, like granite and basalt. Here and there, however, Nature has been a bit more generous with her feldspathic treasure, and the great bulk of commercial production comes from those occasional great shoots of coarsely crystallized granite intrusions that are known to geologists as pegmatites, or giant granites, and to the rapidly growing "rockhound" fraternity as likely localities for prized cabinet specimens of tin ore, blue, pink, green and black tourmalines, beryl, columbite, or perhaps some of the brightly colored uranium minerals.

The importance of feldspar in America's everyday living depends to a large extent on the fact that the finely powdered mineral, under strong heat, melts but does not quite become fluid, and on cooling forms a hard and durable natural glass that is nearly colorless, wholly waterproof, easily cleaned, and does not conduct electricity. What finer material for the glaze of your cups,

saucers and plates—not to mention the various ceramic shapes that your wife spots around the house for everything from cigarette ashes and cut flowers to paper clips, rubber bands, and assorted buttons?

Then, too, countless millions of electrical insulators, with feldspar in both body and glaze, are used by our public utilities and by manufacturers of electrical equipment, while vast quantities of special insulating "shapes" are needed in the burgeoning field of electronics.

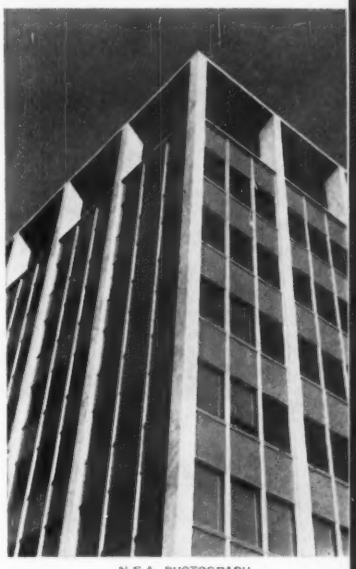
The "enamel" of your kitchen whiteware contains molten feldspar, as does the gleaming white finish of your stove, sink, bathtub and washbowl. In the workshop, the man of the house sharpens his tools on an emery wheel that is "filled" with feldspar to bind the grains of abrasive, and if he is fortunate enough to be able to keep a few chickens, he will probably keep them supplied with crushed feldspar as poultry grit.

In early America, glass was something of a luxury; but it could hardly be called so today. The glassmakers of the nation pour out a veritable river of glass that goes into everything from fancy bricks to microscope lenses; and feldspar plays a vital role in this field, too. Several hundreds of thousands of tons of the mineral are annually used by American glass manufacturers to furnish elements that give modern glass its luster, strength and hardness. And since glass must be cleaned now and then, much of the scouring and cleaning powder for the purpose is based on the mineral feldspar. Ground to flour-like fineness, the microscopic grains of feldspar are sufficiently abrasive to make an efficient glass cleaner, but not quite hard enough to mar smooth, highly polished surfaces.

Many of the items in which the mineral feldspar plays a part may be found in the breakfast nook below. Window glass, light fixture, porcelain-enameled chinaware shelves, flower vase, and the dishes themselves all consume their shares of feldspar, the silicate mineral of many uses.

HEDRICH-BLESSING STUDIO

Feldspar has but few competitors in the domestic glass and ceramics industries. A small tonnage of the rock known as syenite—which might be likened to a granite having little or no quartz—is brought in from Canada every year by the pottery and glass makers, while the latter also use considerable quantities of blast furnace slag as a source of aluminum oxide, where the color of the finished glass product is not the primary consideration.



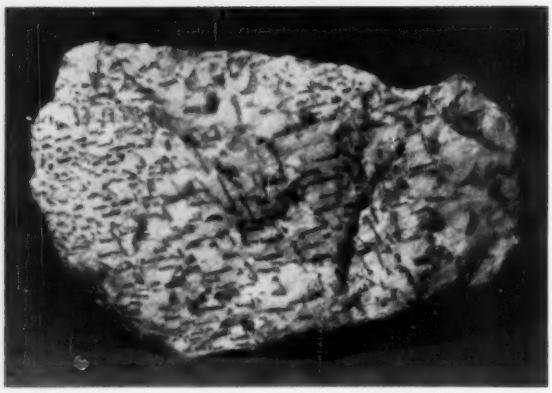
N.E.A. PHOTOGRAPH

The designers of our modern office buildings make liberal use of glass and ceramic tile, as is made evident in this photograph of part of the new National Education Association building in Washington, D. C.

Most of the more than half-million tons of feldspar that are mined each year in this country are taken from great open quarries, where the mineral is blasted out in carload lots. Before the chunks of feldspar can go to the mill for grinding, dark-colored, iron-bearing minerals like biotite mica and black tourmaline — and occasionally some of the rarer minerals—must be "cobbed" or sorted out, and thrown on the mine dump, to the delight of the ever-present mineral collectors. Pegmatites, the geologist's term for the irregular granitic bodies from which most commercial feldspar is taken, are notable for the remarkable size and perfection of their crystal constituents, and for the size of their feldspar crystals in particular. A diameter of several feet is not uncommon for this mineral at some localities; twenty feet is rare; while in Karelia, Russia, mineralogists located what they thought to be a single feldspar crystal that had an estimated weight of some two thousand tons!

This is a mineral that can be ornamental as well as economically vital. One of the showiest of decorative stones is a dark variety of feldspar known as labradorite —from its type locality on the coast of Labrador—which, after being cut into suitable slabs and highly polished, sparkles with an opal-like play of ever-changing colors. The beautifully translucent variety of feldspar called "adularia" makes a semi-precious gem stone, opalescent specimens being cut and sold under the name of "moonstone." Amazonite, a richly blue-green feldspar—for which Pike's Peak in Colorado has long been a notable locality—is sometimes worked into a semi-precious gem.

One of the mineral world's great oddities is furnished by the queer intergrowth of feldspar and quartz, not uncommon in granite pegmatites, that is known as "graphic granite." In this queer rock type, quartz has arranged itself in a matrix of feldspar in such a way that,



PHOTOGRAPH BY THE AUTHOR

An oddity of the mineral world is the mixture of feldspar and quartz called "graphic granite," in which oriented growths of darker-appearing quartz make a hieroglyphic-like pattern on a background of lighter-colored feldspar.

broken through in the proper direction, a cross-section looks for all the world like the pothooks of an ancient cuneiform message.

It has been suggested that the first feldspar miners in the United States were not white men, but rather the Indians of North Carolina. In that State's Mitchell County there are many large deposits of this mineral, and in the course of extracting sheets of the accompanying mica for use as wampum, the Indians learned that the feldspar they were discarding was valuable to the white man. Some of this Indian-mined feldspar is said to have been carted by ox-team to the Atlantic coast in 1744 and shipped to England to be used in pottery manufacture. Whether or not this pleasant old mining story is wholly accurate, the fact remains that North Carolina still heads the list of our feldspar-producing States, and is followed by South Dakota, Colorado, New Hampshire, Virginia and Maine, with Wyoming, Connecticut and several other States contributing minor amounts.

Two of the first white men in the United States to get into the feldspar-mining business were Brainard and Clark, who as early as 1825 were jumping like grasshoppers from one feldspar outcropping in Connecticut to another taking out nothing but the choicest ore from each and shipping it to England in wooden barrels. Traces of the "ground-hogging" done by Brainard and Clark still may be seen at many of the small—and nowadays uneconomical—pegmatites that are common in parts of the Nutmeg State.

At about the same time, but farther to the north, the State Geologist of New Hampshire, Dr. Charles T. Jackson, was also doing some exploratory work around that State's numerous feldspar outcroppings, taking samples, analyzing, and speculating about a possible great future for New Hampshire feldspar. "The Grafton and Wilmot felspar (sic) have. . .been tried," said this remarkable doctor-geologist-agronomist, "and have been found to make the finest mineral teeth." And, he ventured, "when we are more advanced in the arts, I have no doubt that porcelain works will be erected in New Hampshire, near some of the extensive veins of good felspar. . ."

Years later, some of Dr. Jackson's "extensive veins of good felspar" became widely noted for their production of this glistening mineral—and they still produce today. As for the Doctor's "mineral teeth," feldspar is beginning to encounter stiff competition from the plastics industry in that particular application, although the finest grades of the mineral long have been used in small quantities for the purpose.

Less spectacular, perhaps, but of far greater significance than any artistic or industrial uses is the role played by the mineral feldspar in the economy of growing plants, and through plants, on the animal life of the world. Under the ceaseless attack of the carbon dioxide of the air and acids of rain and ground water, the exposed feldspar of our rocks slowly decomposes, setting free its alkalies in the form of carbonates that are available to the rootlets of plants. Plants, in turn, pass along this mineral to animals—including human animals; so you may justly feel that here again, though in a subtle sort of way, there is feldspar in *your* life! ❦ ❦ ❦

MOMENT OF REALITY *By Carrie Ward Lyon*

Where the road curved I saw the hillside burn
Sunbright beyond, the others passed, indifferent
To something strange, sweet there, I was intent
On finding, waiting for — It made me turn
Aside to climb the hill and lie stretched out
On the warm ground, let grassy tides of air
Lave my small limbs, loose the snood from my hair.
A bird spoke briefly and bees drowsed about
Fresh flowers more beautiful than I could bear
So that tears stung my eyes and yet I had
No sorrow. I had never felt so glad,
Heard songs of things around me everywhere.
My hill's made flat: years run away with me
But not that moment of reality.

This rare pigmy angelfish, a scant two inches in length, is the only one of its kind ever to be exhibited alive. With bright orange head and breast contrasting with glowing blue body, the pigmy angel peers at visitors at the Miami Seaquarium in Miami, Florida.

This Angel Has Fins

By WILLIAM KOFOED

Photograph by the Author

A MONOCLED mystery of the marine world and first living representative of its species to meet man is now peering at people from a tank in the Miami Seaquarium, at Miami, Florida.

The mystery is the pigmy angelfish, the first ever to be taken alive and the first ever to be exhibited alive. Since 1908 this species has been tantalizing marine zoologists because of its apparent rarity.

The pigmy angel is about two inches long, whereas the queen angel, French angel, and other members of the angelfish family are a foot or more in length. The head and breast are bright orange, while the rest of the fish is a glowing ultramarine blue that seems almost phosphorescent. Surrounding the eye of the pigmy is a "monocle marking" of the same glowing blue color.

This small marine specimen is the major prize of a Seaquarium collecting expedition to the Bahamas reefs in June of 1958. One of the crew, Phil Case, who had just finished lunch on June 6, decided to try his aqualung in water about forty feet deep. He slipped over the side for a look along the bottom. Within a few minutes he reappeared at the surface and excitedly announced that he had just seen a small fish of a type quite new to him. Handed a small dipnet, he again descended to the bottom.

Mr. Case soon reappeared on the surface with six small, brightly colored fish in his net. Within the next few days, seven more were caught in the vicinity. Of the thirteen, twelve died within the next few weeks. The remaining pigmy, however, after six months of captivity, is healthy and apparently well adjusted to his Seaquarium environment.

Immediately after the capture, Seaquarium curator Craig Phillips, who accompanied the expedition, thought he was looking at some new kind of pomacentrid, or damselfish, because it had a damselfish-like shape, flattened, with smoothly rounded dorsal and anal fins. On closer examination, however, Mr. Phillips noticed a tiny but well-developed spine that extended backward from its preopercle, or gill cover. That meant only one thing. The fish had to be a pomacanthid, or angelfish; and furthermore, its shape strongly suggested a *Centropyge*, a genus of miniature angelfishes.

On returning to port with the thirteen specimens, Phillips placed them in a 500-gallon viewing tank and then called Mr. Loren Woods, curator of fishes at the Chicago Natural History Museum. It was quickly established by telephone that these little fishes were *Centropyge argi*, of which only two specimens were on record.

To confirm the find absolutely, Mr. Woods sent one of the two preserved specimens for Phillips to examine. The live specimens and the preserved one matched, except that the new ones represented the heretofore unseen juvenile form of the fish.

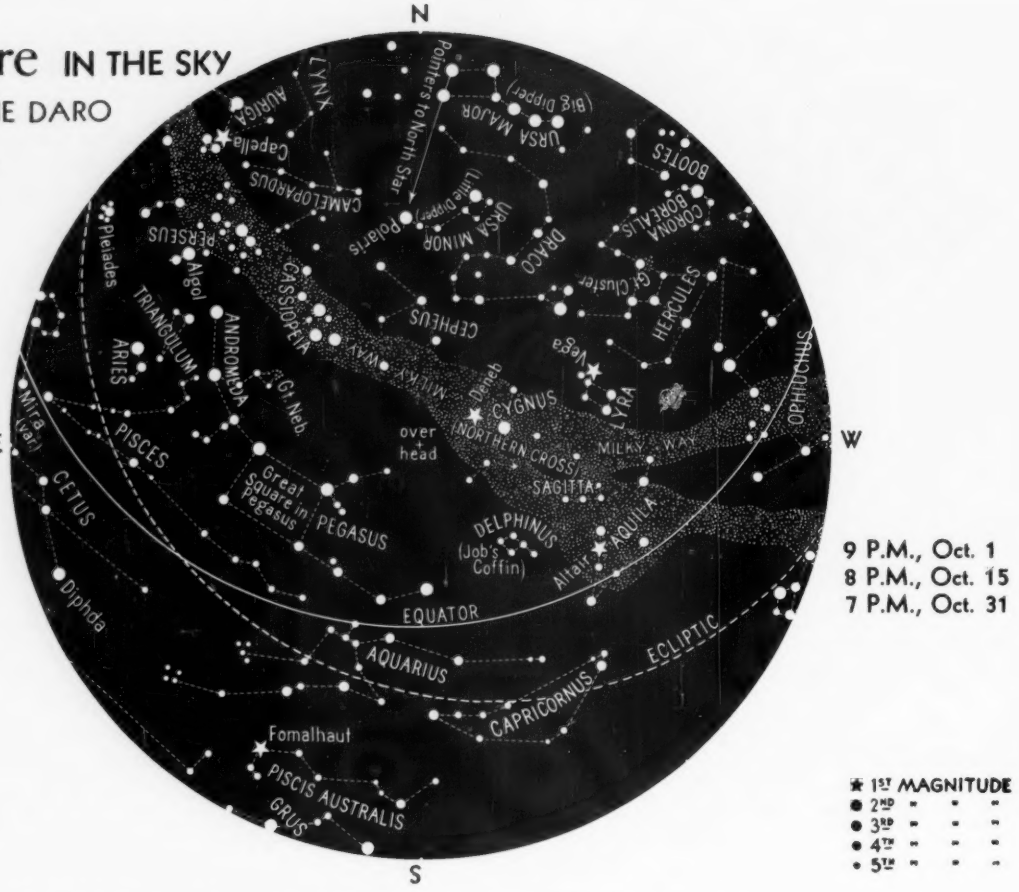
The thirteen pigmies were quarrelsome and "nippy" at first, but with plenty of territory and coral rock in which to hide they began to settle down to a normal existence. They were well satisfied with a diet of ground fish and squid. But within two weeks, twelve of the fish were dead from unknown causes.

Men first saw the pigmy angelfish back in 1908. Louis Mowbray, now curator of the Bermuda aquarium, caught a new fish in ninety fathoms of water on the Argus Reef, off Bermuda, in a deep trap or trawl. But it was dead when he drew up the trap. He sent the preserved specimen to the Chicago Natural History Museum where it remained a mystery fish from 1908 to 1951. In 1951, it was described as the new species *C. argi*.

Then, in 1952, ichthyologists were electrified by the find of a second pigmy angel—dead in the stomach of a snapper caught in forty fathoms of water on the Campeche Banks, off Yucatan, Mexico. (*Continued on page 440*)

Nature IN THE SKY

By SIMONE DARO GOSSNER



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. Times given are for Local Standard Time.

The Giacobinids

THERE IS a slim, but definite, possibility that a heavy meteor shower may take place during the night of October 9 to 10 of this year. If it does, it would be a recurrence of the spectacular displays of 1933 and 1946. The swarm of meteors responsible for this shower is associated with the periodic comet Giacobini-Zinner.

The comet itself is faint and has been a frequent denizen of the astronomical "lost and found" department. It was first discovered on December 20, 1900, by Giacobini at the Nice Observatory (France). Three observations were obtained within the next few days, but the comet was already receding from the sun, and soon became too faint to be seen. On the basis of these few observations it was possible to compute its approximate path, or *orbit*. It was found to have a period of about six and one-half years, after which, presumably, it would return to the vicinity of the sun and be visible again from earth.

There is no doubt that it did return in 1907, as was amply proved in later years, but observers were unable to find it. It was rediscovered accidentally in 1913 by Zinner at Bamberg (Germany). "Comet Zinner" was first thought to be a new one, but after its orbit was determined, Giacobini was able to show that this was indeed his own. It was called thereafter comet Giacobini-Zinner, and its periodic return, every six and a half years, was firmly anticipated. But in 1920, once again, it eluded all telescopes.

After this, however, it was recovered successively in 1926 by Schwassmann at Bergedorf (Germany), in 1933

by Schorr, also at Bergedorf, in 1939 by Van Biesbroeck at Yerkes (Wisconsin) and in 1946 by Jeffers at Lick (California). It was missed again in 1952, and astronomers wondered whether it might have disintegrated. They need not have worried: comet Giacobini-Zinner was found again on May 8, 1959, by Elizabeth Roemer at the Flagstaff Station of the U. S. Naval Observatory.

Comets are not solid bodies. They are formed of countless small solid particles and gases. As they travel in their orbits around the sun, the pull of gravity of the other members of the solar system gradually causes some of these particles to become scattered along the comet's orbit. Whenever the earth crosses that orbit, the particles collide with the earth's atmosphere, and meteors—or shooting stars—are seen.

In the case of a young comet, however, the swarm of particles is still very heavily concentrated around the comet itself, because it has not had time yet to be completely dispersed. Under these circumstances, if the earth crosses the plane of the comet's orbit when the comet happens to be in the vicinity, a large number of meteors will be seen. On the contrary, if the comet is at some remote point of its orbit at the time, only a few meteors, if any, may be expected.

Comet Giacobini-Zinner belongs to this latter category. Its meteor swarm is heavily concentrated around the comet itself. Although the earth intersects the plane of the comet's orbit once a year (on October 9-10), the two bodies are in general too far away from each other for any remarkable display of meteors.

On October 9, 1933, however, the earth was only eighty days behind the comet. A meteor shower of extraordinary intensity (from 350 to 400 per minute at maximum) was seen in western Europe, shortly after sunset. The shower lasted two hours and thirty minutes, but an hour after maximum the intensity had dropped off so sharply that, by the time darkness fell over the United States, the meteors were barely noticeable.

In 1946, circumstances were even more favorable to the appearance of these *Giacobinids*. On October 9 of that year, the earth was only fifteen days behind the comet. An additional advantage was the fact that astronomers were expecting the event, and had time to plan their observations in detail. Visual observers organized teams of amateurs and professionals to stand watch for three consecutive nights, starting on October 8. Many photographic telescopes were poised for the big moment, and even some radar specialists had their equipment ready to record the radar echoes caused by the expected meteors.

The shower did come, just as predicted. Cloudy skies in some States frustrated the efforts of a number of visual and photographic observers, but elsewhere their patience was rewarded by a truly spectacular sight and many valuable observations were recorded during the shower.

As in 1933, the shower was of brief duration, with a very sharp maximum. Most meteors were faint, but a few fireballs were seen. The most remarkable observations were those of the radar echoes. Pierce, at Harvard, operating on a wavelength of 86 meters, found that the radio waves were being reflected at an atmospheric height corresponding to daytime conditions. In other words, the meteors in the atmosphere were so numerous that they were creating a kind of artificial reflecting layer, whereas under normal night conditions, radio waves would have traveled to much greater heights (for details on atmospheric reflecting layers, see *Nature Magazine* for May, 1959). It was estimated that no less than 4000 meteor echoes must have been present to interfere with radio transmission in such a manner. This shower was a success for many.

BIG BEAR, LITTLE BEAR

Big Bear, Little Bear,
Hail! Between you, you have trapped
The star-shod Dragon.

Ethel Jacobson

Thirteen years later, on October 9-10, 1959, the conditions may again be favorable to the occurrence of a strong Giacobinid shower. On this occasion, however, very serious reservations must be made. The earth will reach the plane of the comet's orbit about twenty days *ahead* of the comet, while it passed there after the comet in 1933 and 1946. We know from the previous showers that there is a highly concentrated swarm of meteors directly following the comet, but, until now, we have had no occasion to ascertain whether the swarm also extends ahead of it. Another adverse circumstance lies in the fact that, during each of its periodic revolutions around the sun, the comet passes very close to Jupiter. The attraction of this giant planet gradually modifies the comet's orbit, with the result that its distance from the earth increases somewhat at each return.

Be that as it may, it may well be worth watching for Giacobinids on the night of October 9 to 10 of this year. For those who wish to try their hand at photographing the meteors—if they do appear—it should be noted that the best method will be to have the camera mounted firmly on a tripod or other rigid support. The Giacobinids (also called Draconids) will seem to radiate from a point in the constellation of Draco. Thus the camera could be aimed toward the north pole, for example. Once the shower is well under way, it is sufficient to take long exposures of that portion of the sky without attempting to snap individual meteors.

In the month of October, the moon will be full on October 16, and the New Moon will occur on October 2 and again on October 31.

Mercury will be an evening star, but will be too close to the sun to be seen. It will set in the west less than an hour after the sun during the whole month of October.

Venus will be a bright morning star, reaching its greatest brilliancy on October 8 (magnitude −4.3). It will rise three hours before the (*Continued on page 440*)

Nature IN THE SCHOOL

By E. LAURENCE PALMER

Professor Emeritus of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

Looking for Blind Spots

NOT LONG AGO I SPENT SOME TIME watching a heron at the margin of a pool. From its behavior, I received the impression that this bird has a wide range of vision, both laterally and vertically. This is fortunate, because the heron stands in exposed places to feed, and must, for the most part, seek its food below head-level and avoid enemies above and to the sides. The heron must have as few "blind spots" as possible.

Blind spots are important in the life and death of organisms, the planning of international affairs, and even in such pedagogic matters as planning programs of study. Not only have I been watching herons lately; I also have been watching the juggling of international affairs in Europe, and discussing programs of study with educators from Minnesota, Iowa, New York, Pennsylvania and Georgia. As Schiller wrote in *Tantalus, or the Future of Man*, "the power of the professor is revealed not so much by the things he teaches, as by the things he fails or refuses to teach."

The fate of a heron may not be controlled so much by the things it sees as by the influence of things it does not see. The future of world peace may be determined not so much by what appears in documents outlining international agreements as by the things that are left out of such contracts. The effectiveness of a course of study at any level—and particularly at the elementary level—may be measured by the fundamental things that have been given only slight consideration. For years I have been calling attention to some of these things. Now I wish to repeat and elaborate on some of my suggestions.

More about less

Among the college professors with whom I spent considerable time recently were many who thought that the only progress lay in specialization, in analysis, in "knowing more and more about less and less." Of course, it is necessary that there be specialists, and of course they make phenomenal contributions to our understanding of the world. When I was four years old, I got a drum as a Christmas present. I took it to pieces to see where the sound came from and, to the delight of some of my relatives in the house, was never able to put it back together again. However, I did learn something about taking things to pieces and, as I have written repeatedly in these articles, I feel that when we use statistics in any field the basic data must be valid—and validity is often attained only by meticulous and critical examination and specialization.

It was easy for the heron beside the pool to see over a considerable range, but in its immediate environment there were things it could not see. Obviously, at times, it was specializing in interpretation of movements in the water near its feet. When the bird moved its head it increased the part of the environment significant to itself, and eliminated some of the blind spots that might have been dangerous. My recent contacts with leaders in my field from the mid-West and the Southeast wiped out some blind spots I have had, and I have been busy trying to put these experiences together to increase my understanding. After we specialize, we must generalize, or we can not make the best use of our experience.

Here are a few blind spots in the field of nature education that I think we would do well to explore, and then put them together or integrate them with what we recognize as presently significant.

Significance of borders

We have hardly begun to appreciate the significance of borders between different types of environment, borders between the needs of associated organisms, borders between the recognized fields of science, borders between the interests of associated persons.

In our school science, we have done much in the field of recognition of organisms. We have studied the greatness of space and time far beyond our ability to appreciate them, but we have done little at the lower grade levels to appreciate chemical differences, even those that may be significant to our senses. We have done much in understanding the conservation problems of rural areas, but little to understand these problems in the urban and suburban areas where the interests of conservation are being defeated by the largest numbers of people.

We are making remarkable studies of the problems of growing populations, but are neglecting ample consideration of the personal and basic behaviors that create these disturbing situations. We have encouraged youngsters to ape the behavior patterns of adults without first preparing them to judge fairly the results of what they may do. We have developed elaborate means of measuring educational progress without always recognizing the limitations inherent in not recognizing that our data may be invalid.

Recently we have been surprisingly successful in being able to get financial backing for educational programs designed to improve teaching, without recognizing that we may be creating a generation that believes it can grow *only* if it receives a subsidy from government, industry or capital. This may be really dangerous, and may be a blind spot in what may seem to be a bright present and a rosy future. United effort is effective, and we must work together to make our efforts effective, but we should never forget the importance of the existence of strong individuals, of materials whose characteristics are thoroughly standardized and understood. It may well be that one of the most dangerous concepts now held by some teachers is that it is not as important to know your subject matter as it is to know how to teach. This blind spot must be eliminated if we are to compete successfully with rival societies of the world.

Much emphasis is given today to the idea of "selling" our philosophies of economics, of government and of ethics to the rest of the world. Perhaps we should see if there might not be a blind spot in this reliance on salesmanship. We have done

much to glorify the use of credit and we are steadily going farther into debt. Some of us find it difficult to make sense out of some of our modern "art." We have seen good theater almost vanish. We are seeing good music replaced to a large extent by trash on our radio and television programs. We see trash literature flourish while the classics go unappreciated. We have seen "quiz programs" prosper in spite of the fact that their sponsors obviously have little or no understanding of basic biology or the physical sciences.

Which is the most dangerous—the teachers who advance despite a limited knowledge of their subjects; international politicians who can not keep their heads in the face of flattery, cajolery, and endless toasts, or salesmen who try to sell you what you neither need nor can afford? 🚶🚶🚶

Japanese Honeysuckle

Japanese honeysuckle is a pest and needs control. That is the conclusion of the Men's Garden Club of Maryland, which has named Richard C. Ward, 6213 Pilgrim Road, Baltimore 14, Maryland, as chairman of a committee to see what can be done about ubiquitous *Lonicera japonica*. Maryland's State Forester states that this entwining and choking vine now infests eight percent of the forested land of Maryland, and one tenth of Georgia's forests. If you wish to cooperate with Mr. Ward and his committee just let him know.

For Nebraska Doves

Nebraska Dove Protection Association has been formed under the presidency of Mrs. Herbert Weston and with headquarters at 904 North 7th Street, Beatrice, Nebraska. It already has the hearty support of several organizations in the State and some national groups, including the American Nature Association. Dues are a mere fifty cents a year to help defray printing and postage expense, and members, both within and without the State, are invited to join up.

Nature Centers

Broadening its scope, following several successful years, the National Foundation for Junior Museums has changed its name to Nature Centers for Young America, Inc. An attractive descriptive folder has been published and will be sent on request to 10 East 40th St., New York 16, N. Y.

I.U.C.N.

The Seventh General Assembly and Technical Sessions of the International Union for Conservation of Nature and Natural Resources will be held in Warsaw, Poland, June 14 to 24, 1960. The general sessions will open with discussion of "The Impact of Man and Modern Technology on Nature and Natural Resources." Field trips to the mountain country and southern Poland's national parks are planned. Information may be obtained from the Secretary-General, I.U.C.N., 31 rue Vautier, Brussels, Belgium.

Bulletins

"Lead Poisoning as a Mortality Factor in Waterfowl Populations" is Vol. 27, Article 3 of the Illinois Natural History Survey. "Although lead poisoning has been a common occurence in wild waterfowl. . ." says Thomas G. Scott, head of the Division's section of wildlife research, "conclusions as to its effect on waterfowl populations to date have been little better than guesses." This bulletin is the first comprehensive treatment of the subject, and includes estimates of the extent of mortality among waterfowl by lead poisoning. Obtainable from the Illinois State Natural History Survey Division, Urbana, Illinois, for fifty cents.

"Community Forests for Rural People" is leaflet 244 of the U. S. Department of Agriculture, for sale by the Superintendent of Documents, Washington 25, D. C., for 5 cents. A community forest can serve as a meeting ground, laboratory, wildlife home, and source of income for rural people, and this little booklet tells how such a community forest can be brought into being.

"An Outline for Teaching Conservation in Elementary Schools," U. S. Soil Conservation Service pamphlet 268, and "Teaching Conservation in High Schools," pamphlet 201 of the same agency, are outlines of an expansion and revision of materials originally developed in a series of five regional conferences attended by educators and representatives of conservation agencies to furnish broad outlines of teacher-pupil conservation learning at both graded and high school levels. They are available from the Superintendent of Documents, Washington 25, D. C. without charge.

THE Nature CAMERA

By EDNA HOFFMAN EVANS

On Pleasing the Judges

I HAD AN EXPERIENCE THE other day that was both gratifying and disconcerting. I think it illustrates several points that I have stressed over and over again in these articles:

1. There is always something new to learn about photography.
2. There is more to getting good photographic results than just pressing the button.
3. Psychology enters, too, if you want your pictures to appeal to a given audience or fit a specific situation.

To tie all this together requires explanation.

I am, as I have often stated, an active charter member of a camera club, and I believe I derive considerable benefit from it. I have been taking pictures longer than most other members of the club, not because I am older (I hasten to add), but because I started earlier than the others.

We have a monthly contest on a subject designated beforehand, and each member may enter two slides (we are a color club). Three judges from among the more experienced of the club membership rate the entries on the basis of impact, interest, composition, and technical quality. A total of 36 points per slide is possible, but few entries get "perfect" scores. Ribbons are awarded to the high point winners, and each award thereafter subjects the winner to a handicap, five points for top awards and two points for honorable mention. Scores accumulate from September through May, and the "top ten" are the ten members who accumulate the highest scores during that period.

An additional award goes to the member who has taken the best "slide of the year," and to the "photographer of the year" whose four slides, entered in the June contest, accumulate the highest number of points. Judging for these two awards is done by another camera club in some other State.

Finally, we have a club award that goes to the photographer whose work has shown the greatest improvement for the current year over the previous year. This is based on a comparison of points accumulated in the ten monthly contests.

Improvement indicated

For the 1958-59 club year, lo and behold, I was chosen "photographer of the year," and also the one showing the most improvement. The former award was gratifying. The latter was somewhat disconcerting. After all the years I have been taking pictures, I did not think I could show so much improvement! But, as the old saying goes, we are never too old or experienced to learn. It also illustrates my point that there is always something new to be learned about photography.

What did I do this past year that I did not do the previous year, or the year before that? My equipment had not changed to any great extent, nor had my techniques. What had improved?

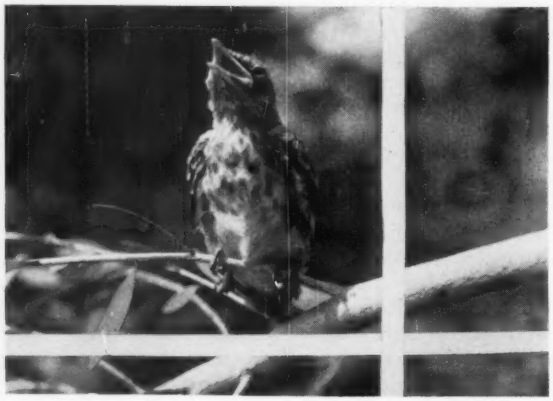
After considerable thought, I have decided that the difference lies in the care I have been taking with my slides after they have been processed. The same would hold true with black-and-white prints in the enlarging and printing process. Indeed, the black-and-white photographer can do more with his prints—toning, paper textures, vignetting, dodging, paper negatives, and the like—than can the color photographer.

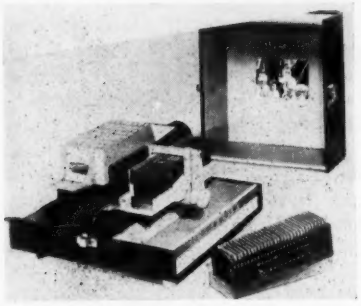
Lately, I have been taking more pains in masking and mounting my slides. This, I think, is the secret. In previous years I seldom masked them, even when I did mount them in glass. I simply used the standard 35mm aperture and let it go at that.

In the past year, on the other hand, I have taken more time with the finished product. By having a variety of masks of different sizes and shapes I can do much to change the effect of the projected transparency. If there is something distracting on one side, I mask that out. If the picture looks

A picture or slide may be cropped or masked for more effective composition. By blocking out or cutting off unnecessary material, the wood duck becomes the center of interest. Note that duck is not quite centered in picture, yet is the main object that catches the eye.

Cropping or masking improves this shot of a baby mockingbird. Also, a completely square format might be used if care is taken to keep the center of interest out of the exact center of the picture. The picture also could be reversed so that the baby mocker would face to the right.





Shown are features of the new Bell & Howell Headliner Model 710 projector. On left top of the projector is the slide editing panel that allows operator to view individual slides before loading them into slide tray (bottom right). Inside projector case cover is a 10½ x 11½-inch screen for close-up individual or informal showing.

better in a square format, that is what it gets. A long, thin picture is masked accordingly, with unnecessary material at the top and bottom (in a horizontal) or on the sides (in a vertical) cut out.

Center of interest

Location of the center of interest is important, too. Centered, it may be much less effective than if it is moved slightly above or below, to the right or the left, of the median line. Some pictures are much better reversed than they are when shown "as is." Slides may be reversed easily; so may black-and-white negatives in the printing process. You may turn a right-handed person into a "southpaw," or vice versa, in this way. Just be careful that there is no give-away detail such as printing or other right-left indication to betray the trick.

There are other little devices that may be used to improve the final effect of a color slide. Adacolor filters, which are thin, transparent tinted sheets, may be mounted along with a slide to improve it. For a slide that is too blue, a yellow filter may make it look more natural; red will help a too-green slide and so on. Since the adacolors come in a variety of shades, the photographer can try a number of combinations until he hits the right one.

For slides that are somewhat overexposed—too bright or too thin—a neutral density filter or two will cut down on the brightness and restore the natural color balance.

Some color photographers also touch up their slides with water color; a bright area can be toned down, or a "hot spot" cooled by skillful use of brush and color. This latter trick I have yet to use.

I learned these things by sitting in on camera club judging sessions, at workshops, at "post-mortems" after contests. Some were actually taught, others I must have assimilated by a process of osmosis. I listened to the judges' reactions, and I harkened to the opinions of fellow members. To be honest, I was sometimes bored—or even annoyed—by the oft-repeated remarks of "reverse it," or "cut it off at the left," or "too much foreground," or "that highlight is distracting." But, all in all, the time spent listening seems to have paid off.

Ways of people

Another thing I learned had to do with psychology. People seem to like some things for no apparent reason, and dislike others. Some trite situations go over with a bang, others fall with a thud. Humor is always welcome; sentimentality, not always. Baby pictures, tops in popularity according to national polls, are not too appealing to our group unless there is more to the picture than just babyishness. Landscapes, another popular subject, must be more than just "pretty" scenes.

Nature pictures meet an especially discriminating audience in camera-clubbers. Such pictures must be "natural," "true to life," technically correct, scientifically accurate, and beyond all this they must have "something" that makes them better than usual. Sometimes I think we are almost *too* critical.

I have tried to decide whether people respond more favorably to the new and unusual or to the old and familiar, and I am inclined to lean toward the former. We live in an area where cactus blossoms are everyday springtime subjects, and so water lilies seem to have a double appeal of both beauty and rarity. For my own part, I did better in our flower contest with a shot of a banana blossom. It was off the beaten track.

A few people respond to a "moody" picture, and when they do they go all-out for it. Most people do not. The contestant must try to outguess the judges when he submits such a picture.

Choosing the slides

In choosing the four slides that I entered in the "Photographer of the

Year" competition, I tried to use psychology. There was no limitation as to subject, so I chose: 1. A landscape that I call "The Promised Land," a really beautiful shot in which all the elements happened to be just right (it was one of those rare, lucky shots) taken in the Colorado National Monument. 2. A tabletop, for humor; 3. One of my "educated," posed-with-doll-furniture toads, because it was unusual; 4. A puppy, for just plain sentiment or, as the judges called it, "dog appeal." Beauty, humor, novelty, sentiment—the combination worked!

Of course the awards, gratifying and disconcerting as they are, carry with them additional challenges. Shall I be content to rest on my laurels, or shall I try to do even better next year?

Time will tell. But of this I am more convinced than ever: There is never an end to the things one can learn or the improvements one may make in photography. •

Now for a couple of news notes.

The new Headliner Model 710 slide projector presented by Bell & Howell has two features that should be of great help to the slide enthusiast. It has an editing panel that permits the operator to view each slide before loading it into the trays for formal projection. This is built into the projector itself.

Also built into the projector case is a 10½ x 11½-inch screen that can be used for informal projection. I would use it particularly in deciding on masks and compositions as I mount my slides. It is something of a nuisance to get out the big screen for this job. I use a white card as my screen for masking projections, but the built-in screen would be much more handy. The Headliner 710, with case, retails for $69.95.

For astronomy enthusiasts, Kodak has a new publication called "Astrophotography with Your Camera." This is a 16-page booklet that tells how the photographer can capture star trails, meteors, and auroras on film with stationary cameras; it also includes sections on astrophotography with guided cameras and telescopes. Among the tables is one giving general exposure recommendations for various cameras, lenses, and films. The interesting little booklet may be obtained free from Sales Service Division, Eastman Kodak Company, Rochester 4, New York.

Giacobinids

(*Continued from page 435*)

sun on October 1, three and one-half hours before the sun on October 15 and 31. At the beginning of that month, it will be located south of Regulus.

Mars, in Virgo, will be too close to the sun to be observable. It will be in superior conjunction with the sun on October 29 at 9 p.m., Eastern Standard Time.

Jupiter, in Libra at the beginning of October, will move gradually to Scorpius and will be north of Antares by the end of that month. It will be found low in the western sky at dark. It will set at about 8 p.m. (local standard time) on October 1, and about 90 minutes after sunset on October 31.

Saturn, in Sagittarius, will trail about two hours behind Jupiter, setting around 10 p.m. on October 1, 9:15 p.m. on October 15, 8:30 p.m. on October 31. It will be found west of the meridian during that whole month.

A total eclipse of the sun will take place on October 2. In the United States, the total phase will be visible in northern Massachusetts and a small part of New Hampshire. The sun will rise partially eclipsed along the Atlantic seaboard. For further details and a general map of the eclipse, see *Nature Magazine* for August-September, 1959.

In addition to the possibility of a Giacobinid meteor shower on October 9-10, the Orionids may be expected from October 15 to 25, with a maximum zenith rate, on October 21, of 25 meteors per hour. Their observation, unfortunately, will be hampered somewhat by moonlight.

Angel

(*Continued from page 433*)

The catch was made by Stuart Springer from the U. S. Fish and Wildlife Service's vessel *Oregon*. From these two catches, experts stated that, although the species is rare, it has a considerable range.

As is usual with angelfishes, *Centropyge* tends to alter its color pattern as it matures. The original two specimens—for which the colors in life were never described—appear, in alcohol, to have the forward portion of the body to the origin of the dorsal fin colored yellow above; this color extends obliquely downward and backward to include the greater portion of the belly. The rest of the fish is quite dark, with a large dark blotch above each pectoral fin.

The adult coloring as well as the adult size of the Seaquarium's specimen is still a matter of conjecture. However, curator Phillips thinks that the adult length will be between four and six inches.

Up to now, the pigmy angel has not received a common name. However, Mr. Woods suggests the name of "cherubfish" because of its size and striking beauty. ❦ ❦ ❦

Bulletins

"A Century of Biological Research," which is Volume 27, article 2 of the Illinois Natural History Survey Bulletin, is a record of one hundred years of the scientific progress of the Survey. This 234-page paper-covered volume is replete with accounts of both early and contemporary Illinois investigators and their biological work, with photographs of the period. It is obtainable from the Natural History Survey Division, of the Department of Registration and Education, Urbana, Illinois.

"Economics of Forestry—A Bibliography for the United States and Canada, 1953-1954" is a supplement to the forestry bibliography issued in 1950 by the U. S. Department of Agriculture Library in cooperation with a number of national forestry organizations, and which included the years 1940-1947. Subsequently a supplement was issued covering the years 1948-1952, and the present work includes the years 1953-1954. Contains 45 pages of reference work on economic forestry, and may be obtained from the U. S. Forest Service, Washington 25, D. C.

"Our National Parks at a Glance," published by Pacific Coast Publishers, Redwood City, Cal., and priced at a dollar, is Volume 7 of the firm's "Great Americans" series. Written by Monroe Heath, this 32-page large format booklet is an account of the significance, history, scenic and geological features of each of our National Parks, with a list of all other areas administered by the National Park Service. Each of our twenty-nine national parks is treated briefly, in text and with photographs, a single page being devoted to each park.

Nature IN ROCK AND MINERAL

By PAUL MASON TILDEN

Prospecting City Streets

STUDENTS OF NATURE WHO LIVE IN the country have, as a rule, a considerable advantage over their city counterparts. For example, the rural bird enthusiast needs only to step from his back porch to be among his avian friends. His city cousin, on the other hand, usually has no back porch to step from; and even if he had one, the bird life ordinarily available will consist mostly of English sparrows, starlings and pigeons—sturdy birds, to be sure, but nonetheless rather limited in ornithological appeal.

But city life is not a one hundred percent failure, nature-wise. Consider the happy case of the amateur geologist or mineralogist. The phenomenal mushroom growth of modern office buildings provides these students with glimpses of the sub-surface geology of their area, since excavations for such buildings must usually be carried down many feet below ground level.

Not far from where this was written, just such an office-building event took place recently. After clearing the site, the excavators struck into the foundation remains of the old building, and under those the remnants of what appeared to be an even earlier structure — although hardly early enough to be of interest to the archeologist! Then came assorted layers of sand, buff with iron oxides at first, cleaner as depth increased. Under the sand were layers of carbon-stained blue clay, interspersed with streaks of glauconite sand—the so-called greensand—that potash-bearing, rather unctuous sand whose exact origin is still something of a puzzle.

An ancient beach

Finally, underneath the blue clay, the workmen uncovered a thick layer of coarse, roundish cobblestones, closely packed with more sand. It was becoming clear that this particular building was about to be bottomed on a site that was once a sea beach, and later a quiet salt-water swamp, although the place is far from any such environment today.

If our urban geologists and mineralogists were confined to a strict diet of sub-surface observation, their avocations would soon suffer from malnutrition, since sand and blue clay in one city block tend to look much the same in another block. It is at this point, however, that the modern architect comes to the rescue. He insists on the liberal use of rough and polished stone for ornamental facing, so the quarries of the nation—and occasionally those of foreign nations—are literally brought to the doorstep of the city amateur.

He will find granite of many colors from the quarries of the New England States, Wisconsin, Minnesota, Canada and European countries. Polished sections of granite often show patches of coarsely crystallized feldspar, quartz, tourmaline and garnet; these are cross-sections, in fact, of miniature "pegmatites," those dwelling places of larger-than-ordinary crystal specimens. Sections of granite also show, in many instances, swirling patterns of dark minerals that point to some movement within the rock mass while it was still in semi-plastic condition.

There are sure to be displays of the oolitic limestone of Bedford, Indiana, that remarkable "eggstone" that is built up of tiny oval figures, each formed around a minute mineral grain. Other limestones will prove veritable museums of fossil corals, sponges, algae, sea shells and broken remnants of other marine plant and animal life of the past.

Variety of marble

The city naturalist will see snow-white marble from the famous quarries of Rutland and Proctor, in Ver-

(Continued on following page)

For the follower of the geological sciences there is much to be seen on city streets. For example, in the photograph below, part of a highly polished slab of granite shows a distorted feldspar crystal (about one-fifth actual size) that shows evidence of having been melted after it crystallized. Background consists of small, roundish blobs of feldspar, colorless quartz, and irregular patches of biotite mica.

mont, and pastel-tinted marble from the pits of Tennessee and Georgia, with perhaps now and then an example of the fascinating brecciated marble of Italy, used by architects for the past two thousand years or more.

Some buildings will show panels of verd antique, the green and white mottled "marble" that is not marble at all, but an altered form of the rock called serpentine. The red sandstone that was one so popular with the builders of an earlier day has passed from favor, although there are still many "brownstone" buildings in service. Such older sandstone construction will usually reveal a considerable amount of chipping and "spalling" of the outer layers, illustrating how the cementing material of the minute sand grains of this rock type are vulnerable—even in relatively short periods of time—to mechanical and chemical weathering.

There is much, indeed, of interest to the "rockhound" in the city, although as a rule the camera must be substituted for the collecting bag, and there will be little use for mineral hammer and chisel. You may find a handsome specimen on a city street, but "you can't take it with you!"

Studying Sea Otters

The U. S. Fish and Wildlife Service reports that something new in range studies has been brought into play during a sea otter food study at Kuluk Bay, Alaska. The sea otter feeds in several fathoms of water—cold water, at Kuluk Bay—and investigating biologists must of necessity be diving biologists. Therefore frogmen's suits, with self-contained under-water breathing apparatus (SCUBA), is the correct attire for sea otter investigators in this area, where a small pod of the mammals has established itself. The sea urchin (whose empty shells are commonly seen on the beaches of our other seaboard States) is a primary article of diet for the sea otter, says the Service, and it was commonly found on the ocean floor at Kuluk Bay. Under protection for a number of years, the sea otter, once virtually exterminated, has made a promising comeback in the State of Alaska and may be seen at other places along the Pacific Coast. (A fine description of the life and habits of this mammal may be found in Victor H. Cahalane's *Mammals of North America*.)

"Pinky"

A BEAUTIFUL little male purple finch, who never expected to know life indoors, is now a prized household pet in Plymouth, New Hampshire, where it has made its home since late October, 1957. "Pinky,"—so named because of his feathers of dull, rosy red, and crest of similar color—was "grounded" with a broken wing in Plymouth and was found by Calvin Carpenter, youthful proprietor of the Plymouth Inn, and his companion, Willis Mack. These two heard the cries of the bird, found it, and took it to the inn, where the finch was immediately given good care and placed in a cage near another occupied by a pet parakeet called "Honey."

As time passed, the timid little purple finch responded to good care, thoughtful feeding and the attention of folks at the inn, although Pinky found that he could never really fly again. Months passed, and while the parakeet already roamed at will through the rooms of the inn at various times of the day, no one quite believed that Pinky might, also.

Pinky, a male purple finch, is handicapped by an injured wing, and makes his home in a friendly inn at Plymouth, New Hampshire

But Pinky, with his sweet warble, became so tame that the door of his cage was opened much of the time while he roamed about at leisure. He could fly a bit, but was contented to fly to the top of his cage and perch there. Or, when folks were not looking, he might walk about the floor, or find the stairs leading to the upper rooms, where he could be found on a bed, a dresser, or perched on a window-sill, singing. Finally he decided on the little family kitchen, where he liked to sit in a sunny window.

Both birds began to wander about so much that there was danger of losing them, and the family began to be more careful about releasing them from their cages. But in the spring of 1958, Honey died, and Pinky was left alone. Obviously he missed his bright companion, but he sang on, day after day.

Then, virtually on Christmas Eve, 1958, a young member of the Carpenter family brought in a beautiful evening grosbeak, badly injured. The Carpenter family prepared the cage once occupied by the parakeet, and everyone hoped that the grosbeak might live, to be another companion for Pinky. But the next morning Pinky was alone again—the grosbeak's injuries proved fatal.

And so the days and months roll by. Pinky, the purple finch, a representative of the species now designated as New Hampshire's State Bird, reigns supreme at the inn, winning many friends. Other States across the nation have their State birds; but I imagine that New Hampshire is the only State in the Union to boast of a State Bird in such delightful captivity!

ARIA CUTTING ROBERTS

Bulletins

"Fishery Statistics of the United States—1955" is statistical digest 41 of the U. S. Fish and Wildlife Service, a 446-page paper-bound, illustrated report on the economic and biological aspects of the domestic commercial fisheries for that year. Starting with a general review of the U. S. fishing industry, this volume furnishes detailed answers to anyone who wants to know the kinds, quantities and value of commercial fishes taken during 1955, and where they were caught. The price is $2.00, paper-bound, from the Superintendent of Documents, Washington 25, D. C.

"Trees and Game—Twin Crops" is a 32-page booklet by Arthur Carhart, widely known outdoor and conservation writer of Denver, Colorado, in which the author shows, in story and illustration, the close link between wildlife welfare and the nation's commercial timberlands, of which there are some half-billion acres. Thus, Mr. Carhart shows, there is a vital connection between wildlife welfare and the commercial reforestation that is going forward under the nation-wide "Tree Farm" movement. A copy of this well-written and finely illustrated booklet may be secured on request from the American Forest Products Industries, Inc., 1816 N Street N. W., Washington 6, D. C.

Teacher and Student Aids

The famous "Palmer Educational Inserts" have now reached the 100-mark. A limited number of many of these 8-page Educational pamphlets are still available, as long as they last. Immensely valuable for natural history projects in science, biology and conservation.

Single copies, 20 cents each; 10 or more, 15 cents each; 50 or more, 10 cents each. (NOTE: Those indicated by asterisks are in shortest supply, so in ordering these indicate an alternate choice.)

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Titmice Are Friendly

To my sister, Ruth, is due the credit for "taming" a pair of titmice! Seeing them around the stump where we cracked black walnuts suggested to her the use of nuts as bait to coax them from the yard to our porch.

After a few weeks of perseverance, she got the birds nearer, inch by inch, until they were coming to her hand for the nuts with which we learned to keep our pockets filled.

I speak of the birds as a "pair." We had no way of knowing which was which, but guessed at it by the difference in their personalities. One was domineering, the other mild and gentle. We called them "Mr." and "Mrs." She looked older than he; but it may have been family cares or the results of his browbeating. She was good-natured and took tyrannizing meekly.

She was harder to win at first, but after she once found we could be trusted, she trusted us more fully than he did. She would fly to my hand the whole distance from the woods, when she heard my call, while he made several stops along the way for further inspection to assure himself that I was safe to approach. He would never turn his back to us, but she had no fears—except of *him*. He gave orders and she obeyed. When she would not come in answer to our call it was because he was issuing commands, *sqree-ert*, *sqree-ert*, which never failed to bring her to attention.

When we called *chip-chip-chip-chip* in high voices, and the birds heard from the woods, they would come flying to the apple tree near the house and stand excitedly jerking their heads from side to side. He advanced cautiously, branch by branch, alighted on my hand with a little spring, and held on with tight clutch while he hammered away at the nut until he broke off a piece and flew away with it to the oak tree. There he held it with his feet against a branch, pecking off little mouthfuls.

When she alighted on my hand it was with such a gentle flutter that I hardly felt her weight—quite different from his quick spring and clutch. At first we let them take the nut, but found it was more fun to hold it tight to make them stay with us longer. The pair were soon following us around whenever we were outside. Then they learned that we lived in the house; and next, that the house had doors! So they went from one door to another looking for us. One day as I was lying down in a room with an open window, one of them looked in. The next time I took nuts with me, and soon had them coming into the room. The mirror had to be covered. They lit on the bed, head or foot, dresser top, and on top of the open door.

CLIFF RATTENBURY

Friendly titmice like the little mite above can be fun to feed and observe.

While lying down, I fed them at first from my hands. Then I scattered nuts on the bed. I tried holding a nut in my lips; but this was too easy for them, so I held it between my teeth to make them tug for it.

This game went on all winter. But as spring and the nesting season approached, they began to lose confidence in us. Gradually our calling failed to bring them. We found them some distance away, utilizing a hole in an old oak stub. A few times they came to us for nuts when we followed them, but soon they would have nothing to do with us.

After the nesting season was over, in the fall, a pair came to us; but there was a difference. We were quite sure the female was a different bird. However, the second training was easy, and we had them again until spring, when we lost them as before.

GRACE ELMORE

Sea Streams

There are many "rivers in the sea," like the Gulf Stream and the Japanese Current, and in a sense they constitute the blood stream of the earth; but it is only in the past few years that science has started to acquire anything like an adequate understanding of them. Existence of the major "rivers" has been known for centuries, and the time has now come when a more precise survey of the "blood stream" is vital, in order to avoid poisoning it by the radioactive wastes of the predicted "atomic age." Some of the newer findings on the vast planetary circulation of ocean waters have been explained in a recent publication by Dr. F. G. Walton Smith of the International Oceanographic Foundation, available from the Smithsonian Institution, Washington 25, D. C.

Quetico Pictographs

A most interesting 8-page folder containing monochrome reproductions of ancient pictographs of the Quetico-Superior area is available, with its accompanying story, from the Quetico Foundation, 224½ Simcoe Street, Toronto 2B, Canada. The work of Mr. Selwyn Dewdney, whose research into the Quetico pictographs has previously received notice on these pages, has so far uncovered forty-one pictograph sites in the Province of Ontario, and another five south of the Ontario-U. S. border. Mr. Dewdney hopes eventually to record every site in the Canadian Shield country.

Park History

The May, 1959, issue of *National Parks Magazine*, published by the National Parks Association, 1300 New Hampshire Avenue, n.w., Washington 6, D. C., is devoted to a concise history of the national park movement. A limited number of extra copies of the issue were printed for the special use of teachers. Copies are available for fifty cents and quotation will be made for bulk orders.

Kenya Wild Life

We have been delayed in receiving and welcoming a contemporary—Vol. 1, No. 1 of *Wild Life*, the official journal of the Kenya Wild Life Society. Both the Society and its journal are devoted to preservation of the wild life in that area. A copy of the magazine is quoted at three shillings in Nairobi, about fifty cents, and the address is Consular House, Coronation Avenue, Nairobi Box 8983. It is a most interesting and attractive publication, which will be brought out quarterly.

THE Nature MARKET

Classified advertising rate — 25 cents a word each insertion; minimum $5.00, cash with order. Abbreviations, initials, and numbers count as words. Discount; 3 times, 5%; 6 times, 10%; 10 times, 15%. December issue closes October 20. Mailing date November 20.

Executive Director Named

Mr. Donald B. Stough of Vienna, Virginia, was recently appointed executive director of the Nature Conservancy, national conservation organization whose specific objective is to preserve natural areas as "living museums," and whose headquarters are in Washington, D. C. Mr. Stough has variously been teacher, journalist, and industrial engineer, and for the past nine years has been in Washington in charge of the natural resources section of the U. S. Air Corps. He replaces Mr. Edward N. Munns, who has been serving in a temporary capacity.

Natural Areas

Since 1947 the Society of American Foresters, Mills Building, Washington 6, D. C., has been endeavoring to locate and have permanently protected representative units of virgin or old-growth forest types for the purpose of future research in silviculture, forest management and related ecological subjects. Such natural areas should be at least 20 acres, within which a single type should occupy not less than 10 acres. Funds have been granted the Society by Resources for the Future for field investigation. Information about such areas should include location, area in acres of each forest type, and the name and address of the owner.

Ancient Animal

A specimen of what may be the earth's oldest kind of multi-celled animal has recently been added to the biological collections of the Smithsonian Institution of Washington, D. C., through the generosity of the Lamont Geological Observatory of Columbia University. A bottom dweller at the greatest depths of the seas, it probably is close to the common ancestral line, Smithsonian specialists think, of the whole great phylum of mollusks. This specimen represents the second known species of *Neopilina*, living representative of the Monoplacophora, a group supposedly extinct for about 3,000,000 years. It is one of four specimens dredged from the bottom of the Milne-Edwards Trench in the Pacific Ocean off Peru, at a depth of about 18,000 feet, by the research ship, *Vema*.

Nature AND THE MICROSCOPE

By JULIAN D. CORRINGTON

Brother Rat

WE ARE FORTUNATE TO HAVE IN OUR POSSESSION a set of prepared microscope slides made by the versatile genius, George Zebrowski, of longitudinal sections of the head of a rat embryo. They are perfectly cut and beautifully stained; some are sagittal (median longitudinal), others parasagittal, or to one side of the median plane. In the one illustrated, the reader who has any familiarity with the anatomy of the mammalian head will have no difficulty in making out the chief structures. Under higher magnification, the histology of each organ is revealed, so that such a slide provides almost an entire course in microscopic anatomy within the bounds of a single preparation. Those who make their own slides are advised to try their hand at this and similar sections of rat or mouse, taken at a time in their development before there is an appreciable amount of bone laid down. Use Zenker or Bouin fixation, hematoxylin and eosin staining.

Starting at the snout, in the illustration, one sees the very large hairs, or vibrissae, in cross section, together with subcutaneous connective tissue and skeletal muscle. These hairs, the rat's "whiskers," are among his most valuable sense organs, enabling him to travel rapidly and surely at night so long as they are in contact with a wall. The skin shows best over the scalp area, where hairs are cut lengthwise in their follicles. The largest organ of the section, toward the top and rear, is the brain and, surrounding this in places, one sees hyaline cartilage and various stages in the formation of bone. Above the brain, the frontal, parietal, and forepart of the occipital bones of the future skull are being laid down directly from membrane, whereas the rest of the occipital and the pieces of vertebrae that show at the extreme rear and bottom are forming from cartilage. There is also considerable ossification to be noted in the maxillary or upper jaw bone, above the mouth cavity and anterior to the large developing teeth, immediately above which may be seen the eye.

Developing teeth

The floor of the mouth also shows developing teeth, surrounded by the ossifying mandible or lower jaw bone. Behind these teeth lies a portion of the tongue, and below this the submandibular (salivary) gland, at the very bottom of the picture. Above and somewhat to the rear of the tongue is a curved slit, one of the semicircular canals of the ear, and to the right of this the internal ear or cochlea. From the fact that both eye and ear are shown it is evident that the cut is not in the midline, but off to one side. This type of section shows a greater variety of structures than does one in the median plane, where many of these organs would not be included.

The eye happens to be cut so as to demonstrate the entrance of the optic nerve, at the bottom, toward the teeth. Near the top and rear the delicate membranes or meninges surrounding the brain are included. Only a small lateral portion of a cerebral hemisphere comes within this plane, but the cerebellum is well indicated as the prominently folded part of the brain at the top rear. Below this is the medulla, and the section just misses the passage of the spinal cord through the foramen magnum of the skull.

Behind and below the tongue are cut pieces of cartilage. The hyoid lies in the base of the tongue and the larynx beyond this. Below the posterior termination of brain tissues are cartilages that will form future vertebrae. In the lower jaw region, temporary teeth of the milk dentition are forming, and below them a permanent tooth. Scattered throughout are small blood vessels and nerves.

After this glowing description of a highly spectacular slide we feel that in sadness but in all honesty we must end this discourse on a sour note and confess to a horrible crime. This slide is the prime example of the dirty trick, professorial variety. We use it in our final examination in histology, requiring the long-suffering and entirely unsuspecting student to identify everything that can be seen in this section. Readers will doubtless heave a sigh of relief that they are not enrolled in such a class!

Head of rat embryo, l.s., 10X.

Schaar Has Semicentennial

FIFTY years ago Bernard E. Schaar founded the laboratory supply company that bears his name. In the latest issue of *LabORATORY*, Lee A. Rauch, president of Schaar

and Company, writes: "It is most rewarding to us, the current generation of Schaarites and Schaarettes, to reflect on the happy associations with thousands of our customers that have developed during our first Fifty Years.

"We're grateful for the faith that you, our customers, have placed in us. As we enter our second fifty years we hasten to assure you that we will do our utmost to continue to merit that confidence and trust. Since service is our business, it is our goal to provide you with the best possible service by giving your requirements the ultimate in attention. As a step on the way to giving you more and better service, we have joined with several other companies to form an association known as LABASCO. Larger stocks of difficult to get items are now available for immediate delivery through the combined facilities of fifteen warehouses."

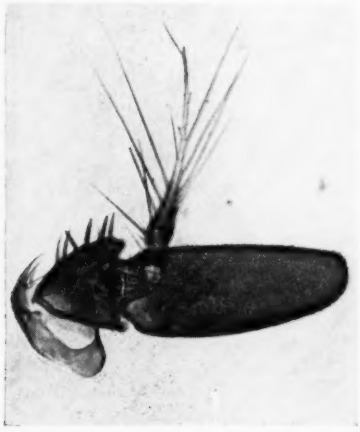
Main office and warehouse: 7300 West Montrose Ave., Chicago 34. Branches in Washington, Detroit, Milwaukee, Augusta, Ga., and Olean, N. Y.

Fly Antenna

AN accompanying illustration shows the *aristate antenna* of the house fly, a highly modified type of "feeler" among insect head adornments. This interesting structure is the culmination of a long evolutionary line of modifications, beginning in the more primitive flies with a simple filiform, or thread-like, type of antenna in which each segment is of uniform thickness and the whole tapers gradually. An intermediate form is the capitate antenna, the terminal segment being enlarged to form a head or knob. Next, the antenna shortens to a few segments, usually three, the last of which bears a slender style or bristle at its tip. Finally the terminal segment enlarges greatly on one side, beyond the style, which then arises near its base on the dorsal side. The style, or arista, may be simple, but is more often outfitted with a double row of secondary hairs along its sides, and is then said to be plumose.

The house fly exhibits a pair of plumose dorsally aristate antennae, and it is this organ that enables the pesky insect to seek out and inspect his immediate surroundings. It makes an instructive slide mount, as the picture shows.

The *aristate antenna* of the common house fly, shown above, is the organ that enables the insect to seek out and inspect its immediate surroundings.



Book Reviews

Handbook of Toxicology, Vol. III, Insecticides, and Vol. V, Fungicides, W. B. Saunders, West Washington Square, Philadelphia 5, 1959.

These are invaluable reference works that no one working in these areas can afford to be without. They are exhaustive, terse compilations of all known data on the subjects, prepared under the direction of the Committee on the Handbook of Biological Data, Division of Biology and Agriculture, the National Academy of Sciences, and the National Research Council.

Vol. III, compiled by William O. Negherbon, consists of 854 pages in small type and costs $14.00. It considers all substances known to have insecticidal value, with complete data and experimental results, fully indexed by subject and author. Headings for each substance are: general, physical and chemical, and toxicological, the last including reports on toxicity to plants, higher animals and man, and all insects upon which tried, together with methods of application, concentrations, and dosages.

Vol. V, 242 pages, $5.50, is edited by Dorothy S. Dittmer, with analysis and compilation by Everett F. Davis, Barbara L. Tuma, and Lucy C. Lee. For each of 196 substances there is given alternative names, molecular formula, structural formula, physical and chemical properties, tests, toxicity, and uses. There is a complete bibliography and index.

A Book That Shook the World is a collection of five anniversary essays on Charles Darwin's *Origin of Species*, a University of Pittsburgh Press paperback, 1958, $1.50. Titles: Darwin and the Idea of Evolution, Julian S. Huxley; The Causes of Evolution, Theodosius Dobzhansky; Christianity and Darwin's Revolution, Reinhold Niebuhr; The Concept of Evolution in Philosophy, Oliver L. Reiser; Hinduism and the Idea of Evolution, Swami Nikhilananda. A brief introduction identifies each of these celebrated authors; two zoologists, two philosophers, and a clergyman, then each paper is presented in this little volume of sixty pages. It is a highly interesting, illuminating and useful centennial publication, and the comparative viewpoints will be found critical, keen, and searching. It is altogether a most enjoyable and informative booklet.

Animal Life is another of the fine works by Lorus J. Milne and Mar-

gery Milne. University of New Hampshire; Prentice-Hall, Inc., Englewood Cliffs, N. J., 1959, 367 pages, with many line figures, 255 photographs, and fourteen as endpapers. It is a textbook of zoology, a natural history, and a philosophy of animal life, all in one. There are many features to be commended—brevity, suited for a one-semester course and not striving for encyclopedic completeness, a fault of some texts; authority; interesting, readable style; excellent format and printing; and superb illustrations in most generous quantity. An attractive gift and a fine text that will appeal to the teacher, the student, and the layman who wishes an up-to-date reference on zoology.

Postmor Temquotes

Samuel Taylor Coleridge

In Xana U. did Hubla Hahn
A stately hippodrome decree:
Where Alph, the All-State fullback ran
Through linesmen mountainous to scan
Down to a wild T. D.

Ten yards meandering with a mazy motion
Through guard and end the churning fullback ran,
Then reached the pay dirt, hailed by shricking fan,
And sank in tumult as a mighty ocean
Surged over him: then heard Alph through the pall,
"Offensive holding, Mount Abora's ball!"

Kubla Khan.

SONGS FOR THE LABORATORY

EVERYTHING GOES

Cole Porter **Anything Goes**

When the Freshman medical student
Dissects with cuts imprudent
Then heaven knows,
Everything goes.
He shaves his stiff with utmost suavity
Then opens up each cavity
Head to toes—
Everything goes.
With glee, he throws the tongue away,
Cuts a lung away,
Whacks a part away
Of the heart away,
Lets it drain away,
Heaves the brain away,
Till at last the backbone shows.
And when he thinks there isn't any,
He finds there's a spleen too many,
Which only shows,
Everything goes.

Bulletin

"How to Use Your Telescope," a 32-page, profusely illustrated pamphlet of the Edmund Scientific Company, Barrington, New Jersey, is No. 9055 in the "Popular Optics Library" of that firm. Here is a publication that should answer just about every question that the beginning astronomer might have concerning the optical mechanics and proper use of his instrument. Available from the Edmund Scientific Company for 60 cents.

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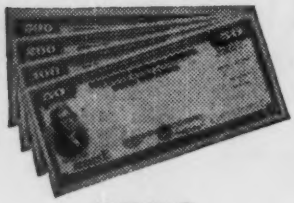
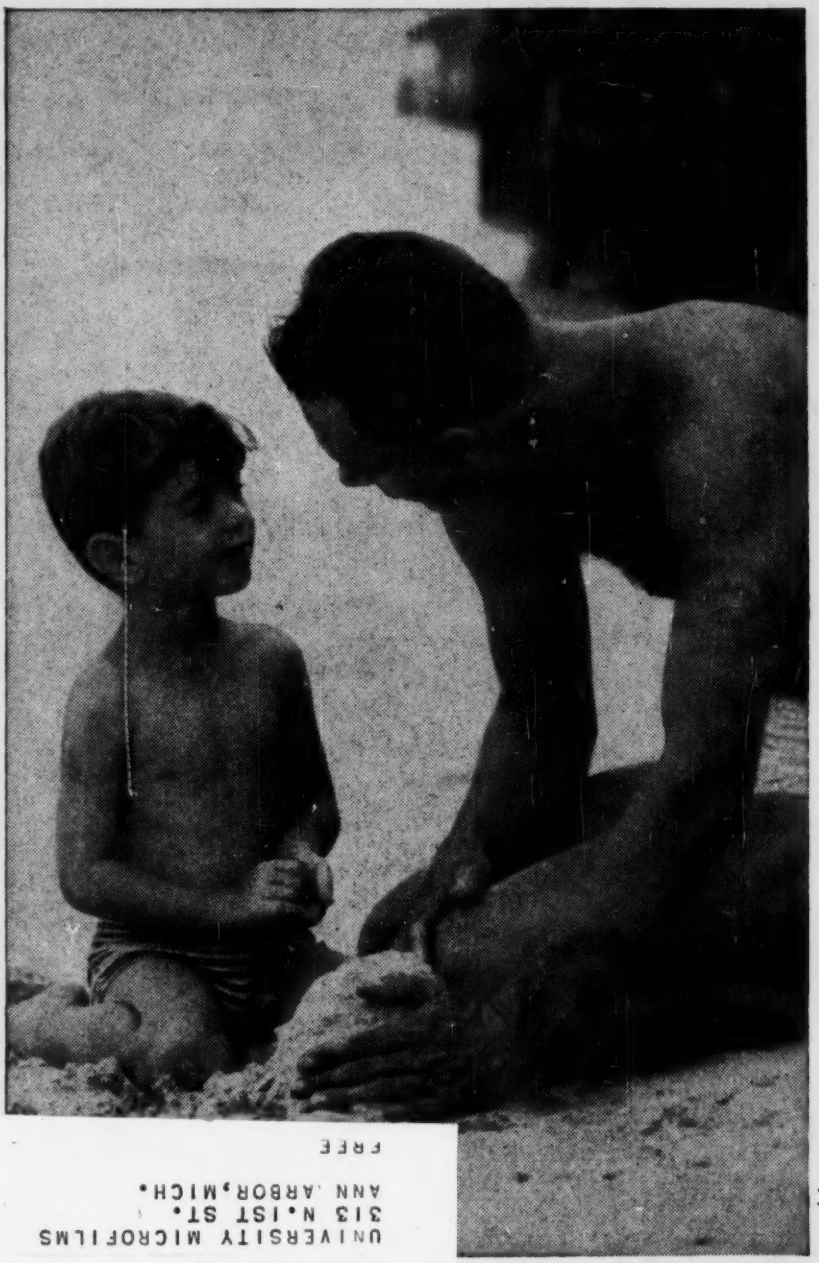


HELP STRENGTHEN AMERICA'S PEACE POWER



Photograph by Harold Holma

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